DOCUMENT RESUME

ED 480 598 SO 035 268

AUTHOR	Jayasuriya, Ruwan, Ed.; Wodon, Quentin, Ed.
TITLE	Efficiency in Reaching the Millennium Development Goals. World Bank Working Paper.
INSTITUTION	World Bank, Washington, DC.
REPORT NO	No-9
ISBN	ISBN-0-8213-5538-4
ISSN	ISSN-1726-5878
PUB DATE	2003-00-00
NOTE	93p.
AVAILABLE FROM	World Bank, 1818 H Street, NW, Washington, DC 20433. Tel: 202-473-1000; e-mail: feedback@worldbank.org; Web site: http://www.worldbank.org.
PUB TYPE	Collected Works - General (020) -- Reports - Research (143)
EDRS PRICE	EDRS Price MF01 Plus Postage. PC Not Available from EDRS
DESCRIPTORS	Developing Nations; *Economic Development; *Educational Improvement; Foreign Countries; Outcomes of Education; Social Science Research
IDENTIFIERS	Argentina; Health Outcomes; Mexico; World Bank

ABSTRACT

The Millennium Development Goals (MDGs) provide clear targets and areas of focus for international organizations such as the World Bank. At a conceptual level, to reduce poverty and hunger, to improve education and health indicators, and to promote gender equality and sustainable development, countries can either increase the resources they allocate to these objectives, or increase the efficiency with which they use their available resources. The four papers presented in this study deal with the second option: increasing the efficiency of countries, and of decentralized entities within countries, in producing good outcomes with their available resources. The first two papers "Measuring and Explaining Country Efficiency in Improving Health and Education Indicators" and "Measuring and Explaining the Impact of Productive Efficiency on Economic Development" use country-level data to analyze the efficiency of countries for improving health, education, and GDP outcomes. The last two papers "Reaching Health and Education Targets in Argentina: A Provincial-Level Analysis" and "Development Targets and Efficiency in Improving Education and Health Outcomes in Mexico's Southern States" use within-country data on health and education from Argentina and Mexico to look at the same issues. Together, the four papers suggest that apart from increasing inputs, it is necessary to improve efficiency to reach the MDGs. Includes 18 notes and an extensive number of tables, figures, and boxes. Each paper contains references. (BT)

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Ruwan Jayasuriya
Quentin Wodon

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Efficiency in Reaching the Millennium Development Goals

Ruwan Jayasuriya
Quentin Wodon

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Washington, D.C.

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First printing: June 2003

1 2 3 4 05 04 03

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ISBN: 0-8213-5538-4
eISBN: 0-8213-5539-2
ISSN: 1726-5878

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Library of Congress Cataloging-in-Publication Data has been requested.

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FOREWORD

The Millennium Development Goals (MDGs) provide clear targets and areas of focus for international organizations such as the World Bank. At a conceptual level, in order to reduce poverty and hunger, to improve education and health indicators, and to promote gender equality and sustainable development, countries can either increase the resources they allocate to these objectives, or increase the efficiency with which they use their available resources.

The four papers presented in this study deal with the second option: increasing the efficiency of countries, and of decentralized entities within countries, in producing good outcomes with their available resources. The first two papers use country-level data to look at the efficiency of countries in improving health, education, and GDP outcomes. The last two papers use within-country data on health and education from Argentina and Mexico to look at the same issues.

The topic of efficiency is especially important in Latin America. Estimates by CEPAL suggest an increase of 50 percent in real terms over the 1990s in public spending for the social sectors in Latin American countries. Yet while this is in principle good news for the poor, the improvement in outcomes has been limited, and below expectations, especially in terms of poverty reduction.

There are some differences in contents and approaches between the four papers included in this study, but their common feature is that they all rely on stochastic frontier estimation methods in order to estimate efficiency measures. The results suggest that while the levels of efficiency in producing health, education, and GDP outcomes vary by indicators, substantial progress could be accomplished with better efficiency, whether at the country or sub-national level. At the cross-country level, an analysis of the determinants of efficiency is also performed. In the case of education and health indicators for example, it is found that bureaucratic quality, urbanization, and corruption together explain a large share of the variance in efficiency between countries. At the sub-national level, the results suggest that apart from differences in endowments between provinces or states, differences in efficiency help in explaining differences in outcomes.

Overall, the results have implications for reaching the MDGs because they suggest that apart from spending more, progress could be achieved by improving efficiency, i.e. by spending better.

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Abstract

To improve the likelihood of reaching the Millennium Development Goals (MDGs), or more generally to improve their social indicators, countries (or states and provinces within countries) basically have two options: increasing the inputs used to "produce" the outcomes measured by the MDGs, or increasing the efficiency with which they use their existing inputs. The four papers presented in this study look at whether improvements in efficiency could bring gains in outcomes. The first two papers use world panel data in order to analyze country level efficiency in improving education, health, and GDP indicators (GDP is related to the MDGs because a higher level of income leads to a reduction in poverty). The other two papers use province and state level data to analyze within-country efficiency in Argentina and Mexico for "producing" good education and health outcomes. Together, the four papers suggest that apart from increasing inputs, it will be necessary to improve efficiency in order to reach the MDGs. While this conclusion is hardly surprising, the analysis helps to quantify how much progress could be achieved through better efficiency, and to some extent, how efficiency itself could be improved.

Acknowledgments

This report is a product of the LCSPP (Poverty) Group, Poverty Reduction and Economic Management Unit (PREM), in the Latin America and the Caribbean Region at The World Bank.

The report includes a brief introduction and four chapters. Chapter 2 was prepared jointly as a background paper for the World Development Report 2003 on Dynamic Development in a Sustainable World, at the request of Christine Fallert Kessides, and as an input for a regional study on public spending and the poor in Latin America funded by Guillermo Perry. Chapter 3 was prepared for a study on growth in Central America, at the request of Humberto Lopez, and with additional support from the World Bank's Research Support Budget. Chapter 4 was prepared as one of a series of case studies for a World Bank study on the Millennium Development Goals, at the request of Margaret Miller and Eric Swanson. Chapter 5 was prepared for a report on a Southern States Development Strategy in Mexico, at the request of Gillette Hall. The work received support from the World Bank's Research Support Budget. The editors are grateful to Guillermo Cruces and Gladys Lopez-Acevedo for providing some of the data used in, respectively, Chapters 4 and 5, and to Norman Hicks and Ernesto May for their continuing support for work on the Millennium Development Goals. Anne Pillay and Jeannette Kah Le Guil provided editorial assistance.

Although the World Bank sponsored this work, the opinions expressed by the authors are theirs only, and should not be attributed to the World Bank, its Executive Directors, or the countries they represent.

CHAPTER 1

EFFICIENCY AND THE MILLENNIUM DEVELOPMENT GOALS: INTRODUCTION

Ruwan Jayasuriya and Quentin Wodon

The United Nations' adoption of the Millennium Development Goals (MDGs) in September of 2000 detailed a framework to promote development in a comprehensive manner. Improvements in education and health indicators, reductions in poverty and hunger, gender equality and sustainable development were key areas highlighted, with targets to be reached by the year 2015.

To improve the likelihood of reaching these targets, or more generally to improve their social indicators, countries (or states and provinces within countries) basically have two options: increasing the inputs used to "produce" the outcomes measured by the MDGs, or increasing the efficiency with which they use their existing inputs. The four papers presented in this study look at whether improvements in efficiency could bring gains in outcomes. The first two papers use world panel data in order to analyze country level efficiency in improving education, health, and GDP indicators (GDP is related to the MDGs because a higher level of income leads to a reduction in poverty). The other two papers use province and state level data to analyze within-country efficiency by comparing the ability of provinces (in Argentina) or states (in Mexico) of "producing" good outcomes in education and health with their available resources. In this introduction, after briefly reviewing the targets suggested in the MDGs, we present the main findings of the four papers.

There are a total of eight MDGs in the declaration adopted by the United Nations. The eighth MDG relates to the development of a global partnership for development, which is beyond the scope of this study. The first seven MDGs can be grouped into three categories: a) Eradicating extreme poverty and hunger; b) Achieving universal primary education and promoting gender equality; and c) Improving health outcomes and ensuring environmental sustainability.

- *Eradicating extreme poverty and hunger (Goal 1).* The first MDG is the eradication of extreme poverty and hunger. To monitor progress, there are two targets. The first target is to reduce extreme poverty by half between 1990 and 2015, and the main indicator is the share of the population living below a Purchasing Power Parity poverty line of US$1 per

day. The second target is to reduce by half the share of the population which suffers from hunger. The indicators for this target are the prevalence of malnutrition, as well as estimates of the share of the population without adequate dietary energy consumption.

- *Achieving universal primary education and promoting gender equality (Goals 2 and 3).* The next two MDGs are to achieve universal primary education and promote gender equality. The target for universal primary education is the completion of a full course of primary schooling by boys and girls alike. There are three indicators to measure progress: the net enrolment ratio in primary education, the proportion of pupils starting grade 1 who reach grade 5, and the illiteracy rate of 15–24 year-olds. The target for gender equality and the empowerment of women is the elimination of gender disparities in primary and secondary education by 2005, and for all levels of education by 2015. The four indicators suggested for monitoring progress over time are the ratio of girls to boys in primary, secondary and tertiary education, the ratio of literate females to males of 15–24 year-olds, the ratio of women to men in wage employment in the non-agricultural sector, and the proportion of seats held by women in national parliament.
- *Improving health outcomes and ensuring environmental sustainability (Goals 4 to 7).* The fourth and fifth MDGs are essentially to reduce child and maternal mortality. The targets for child mortality are to reduce by two thirds, between 1990 and 2015, the under-five mortality rate (with three indicators: the under-five mortality rate, the infant mortality rate, and the proportion of one year old children immunized against measles). The targets for maternal mortality are to reduce by three quarters, between 1990 and 2015, the maternal mortality ratio (with two indicators: the maternal mortality ratio itself and the proportion of births attended by skilled health personnel). The sixth MDG is also related to health: it consists in combating and reversing the spread of HIV/AIDS, malaria, and other communicable diseases. The seventh MDG is to ensure environmental sustainability. While there are many indicators here, an important one consists in halving by 2015 the proportion of people without sustainable access to safe drinking water.

The papers presented in this study deal with several of the above MDGs, using both cross-country and within country data. Chapter 2 is devoted to an analysis of country-level efficiency in producing good education and health outcomes. Using a worldwide panel data set for the period 1990–98 and a stochastic frontier estimation method, the chapter measures the efficiency of countries in improving net primary enrolment and life expectancy (although this indicator is not itself in the MDGs, it is correlated with infant and child mortality). Per capita GDP, per capita expenditures on the respective social sectors (education or health) and the adult literacy rate are used as inputs in the estimation of the production frontiers, which are allowed to vary by region. It is found that there is scope for substantial improvement in efficiency, and thereby in the underlying indicators, in many countries. An analysis of the determinants of the country level efficiency measures is also provided. This analysis suggests that urbanization, and to some extent bureaucratic quality, both have positive impacts on efficiency, albeit decreasing at the margin. By contrast, at least in the specification used in the paper, corruption does not appear to have a statistically significant impact, although the coefficients are as would be expected.

Chapter 3 looks at the efficiency of countries in producing GDP. A higher efficiency in producing GDP would increase incomes and thereby reduce poverty, assuming no large change in inequality. It is first argued in the paper that a limitation of many empirical cross-country studies that focus on determinants of GDP is that no explicit distinction is made between inputs used in production and conditions that facilitate the production process; physical capital, human capital, and labor are genuine production inputs, while the quality of institutions, markets or macroeconomic management are not inputs, but conditions that facilitate production. In chapter 3, it is proposed to take this distinction seriously by studying factors affecting economic performance in two steps. First, a stochastic frontier method is used to measure how efficient countries are in producing output. As in

chapter 2, the results suggest substantial scope for efficiency improvements. Thereafter, an analysis is provided regarding the determinants of productive efficiency. The second step regressions include a range of institutional, macroeconomic and market quality variables, as well as urbanization. Urbanization turns out to be a key determinant of efficiency, with the rule of law and inflation also have an impact on productive efficiency. Estimations are also provided with controls for potential endogeneity, with the key results remaining robust to the use of instrumental variables.

Chapters 4 and 5 are devoted to an analysis of within-country efficiency in Argentina (and especially the province of Santa Fe) and Mexico (with a focus on the Southern States of Chiapas, Guerrero and Oaxaca). The chapters start by providing a brief diagnostic regarding how much progress has been achieved towards reaching the MDGs in each country, and whether the two countries are likely to meet the targets. Thereafter, the focus is on whether improvements in efficiency would help in improving education and health outcomes at the sub-national level.

The two chapters rely in part on the estimation of stochastic production frontiers. As in chapters 2 and 3, separate models are used to estimate the relationships between the inputs and the best possible health and education outcomes that can be achieved by the provinces or states, with the differences between the models essentially consisting in the inclusion of per capita GDP, per capita public education/health expenditure, or both (apart from other variables included in some of the specifications, especially for health outcomes). The rationale for estimating different models is that this enables the authors to check for the robustness of the efficiency measures to alternative specifications of the production functions. Overall, the efficiency measures appear to be robust to the choice of specifications. Additionally, while the results on the determinants of outcomes as revealed by the production frontiers may differ between indicators and between countries, in all cases the authors find room for improving indicators through better efficiency.

To conclude this brief introduction, the four chapters presented in this study suggest that apart from increasing inputs, it will be necessary to improve the use of inputs by national and sub-national governments in order to reach the MDGs. While this conclusion is hardly surprising, and more work would be needed in order to derive more detailed policy implications, the tools presented help to quantify how much progress could be achieved through better efficiency, and to some extent, how efficiency itself could be improved. In the area of public spending, the key message is therefore that apart from spending more, it will be important to spend better.

CHAPTER 2

MEASURING AND EXPLAINING COUNTRY EFFICIENCY IN IMPROVING HEALTH AND EDUCATION INDICATORS

Ruwan Jayasuriya and Quentin Wodon

Introduction

Governments aiming to improve the education and health status of their populations can increase the level of public spending allocated to these sectors, or improve the efficiency of public spending.[1] Since increasing spending is often difficult due to the limited tax base of most developing countries, improving the efficiency of public spending becomes crucial. In order to improve this efficiency, governments have at least two options. The first consists of changing the allocation mix of public expenditures. For example, Murray et al. (1994) argue that by reallocating resources to cost-effective interventions, Sub-Saharan African countries could improve health outcomes dramatically. The second option is more ambitious; it consists of implementing wide-ranging institutional reforms in order to improve variables such as the overall level of bureaucratic quality and corruption in a country, with the hope that this will improve the efficiency of public spending for the social sectors, among other things.

While many papers have been published on the measurement of efficiency in agricultural and industrial economics, applications to social sector indicators remain few. They include Kirjavainen and Loikkanen (1998) for education, and Grosskopf and Valdmanis (1987) and Evans et al. (2000) for health. In this paper, we use stochastic production frontier estimation methods to compare the impact of the level of public spending on education and health outcomes on the one hand, and the efficiency in spending on the other hand, using life expectancy and net enrolment in primary school as outcome indicators. The paper by Evans et al. (2000), used in a recent report of the World Health Organization, is closest to ours, since it analyzes the efficiency in improving disability adjusted life expectancy in 191 countries.

Apart from the fact that we use a different estimation technique and that we apply the technique to two social indicators instead of one, our analysis goes beyond the work by Evans et al. (2000) because we also consider the determinants of efficiency. That is, after estimating efficiency measures

1. There are other options, such as improving economic growth, but these fall beyond the scope of this paper.

at the country level, we analyze in a second step how the quality of the bureaucracy, corruption, and urbanization affect efficiency. We find that urbanization, and to some extent the quality of the bureaucracy are strong determinants of the efficiency of countries in improving education and health outcomes, while the impact of corruption is not statistically significant. Together, these three variables alone explain up to half of the variation in efficiency measures between countries.

While the impact of bureaucratic quality is not surprising, we conjecture that the importance of urbanization may stem from the fact that it is typically cheaper to provide access to education and health services in urban than in rural areas (due to dispersion in rural areas). There could, however, also be other reasons why efficiency would be better in urban areas.[2] It may be easier to monitor performance (easier access by supervisors, possibly more communications among parents/patients and staff, given not only proximity but also ease of contact). It may also be easier to attract quality inputs, especially teachers and health personnel in urban areas. Also, in the case of education outcomes, it may be that urban living provides more environmental reinforcement of good educational performance and student completion, such as more access to reading material and to jobs requiring schooling, more social encouragement for girls to pursue options requiring schooling, and etc.

In terms of the estimation method, as noted by Christiaensen et al. (2002), both deterministic and stochastic techniques have been used to estimate production frontiers. Two common deterministic methods are the Free Disposal Hull, which provides a piece-wise linear envelope connecting best performers, and the Data Envelopment Analysis, whereby linear programming is used to construct the frontier.[3] The main advantage of deterministic methods is that they impose no or few restrictions on the production technology. Their disadvantage is that they do not take into account random factors which may affect outputs. In order to account for the fact that some deviations from the observed maximum output may be due to random shocks, one can use stochastic approaches. There are two main estimation strategies here. Following Aigner et al. (1977), the first strategy is to assume that the error term has two components, one for random errors and one nonnegative component for technical inefficiency (error components model). The second strategy is the fixed effect approach used by Evans et al. (2000), whereby the country with the highest intercept is considered as best performer, and efficiency is computed by comparing the intercepts of the other countries with that of the best performer (possibly adjusting for a minimal level of efficiency).

In this chapter, we rely on an extension of the error component approach of Aigner et al. (1977) proposed by Battese and Coelli (1992, 1995). The rest of the chapter is organized as follows. The maximum likelihood estimation procedure for the production frontier is explained in the next section. That section also describes the seemingly unrelated regressions (SUR) approach used in the second step of the empirical work devoted to the analysis of efficiency determinants. The third section contains a description of the data used and the empirical results. A conclusion follows.

Methodology

A stochastic frontier method is used to estimate production frontiers for health and education outcomes. The estimation is in the spirit of Battese and Coelli (1992, 1995). Specifically, the estimation uses the maximum likelihood program provided by Coelli (1996).

Let Y_{it} represent the health (education) social indicator for country i at time t. The factors or inputs influencing the health (education) outcome are depicted by X_{it}. We consider three main inputs, namely per capita GDP level, per capita expenditures on health (education) and the adult literacy rate.[4] We also add a time trend to capture progress over time, and we enable the produc-

2. These reasons were suggested to us by Christine Fallert Kessides.

3. On the Free Disposal Hull, see for example Deprins, Simar and Tulkens (1984) and Fakin and de Crombrugghe (1997). On Data Envelopment Analysis, see Charnes, Cooper and Rhodes (1978), Coelli (1995), Tulkens and Vanden Eeckhaut (1995), and Gupta et al. (1997).

4. Evans et al. (2000) also used expenditures on health, together with years of schooling. There is a risk of endogeneity in the use of expenditures as determinants of outcomes, for example if expenditures are increased

tion frontier to vary by region (hence the efficiency benchmarks to assess country efficiency are regional, rather than worldwide). This is done by including regional dummy variables for Asia (D_{ASIA}), Europe and Central Asia (D_{ECA}), Latin America and the Caribbean (D_{LAC}), and the industrial countries ($D_{Industrial}$). Africa is the omitted region. For each of the health and education indicators, three separate models are estimated. Model I includes all three input variables along with the time and regional dummies as independent variables. Model II includes per capita expenditure on health (education), adult literacy rate and the time and regional variables, while Model III includes per capita GDP, adult literacy rate and the time and regional dummy variables. We estimate the various models to test for the sensitivity of the estimation results to the choice of the specification, and to ensure that the measures of efficiency used for the second stage regressions are not affected much by changes in specification. The functional form of the production frontiers for either social indicator can be presented as below:

$$Y_{it} = \alpha + X_{it}\beta + \gamma_1 D_{ASIA} + \gamma_2 D_{ECA} + \gamma_3 D_{LAC} + \gamma_4 D_{Industrial} + (v_{it} - u_i) \qquad (1)$$
$$i = 1, \ldots, N, \qquad t = 1, \ldots, T$$

The error term in (1), $(v_{it} - u_i)$, consists of two components. The random noise term, $v_{it} \sim N(0, \sigma_v^2)$, accounts for random shocks and measurement errors. This term is independent of the non-negative term, $u_i \sim |N(\mu, \sigma_u^2)|$, which measures the deviation from the optimal (best practice) outcome, and is used to derive the measures of efficiency.[5] Denoting by N the number of countries, T_i the number of available observations for country i, and $\Phi(.)$ the cumulative standard normal distribution function, the log likelihood function incorporating all the information derived from the distributional assumptions on the inefficiency term (u_i) and the random noise (v_{it}) is:

$$\begin{aligned}
\ln(L) = & -\frac{1}{2}\sum_{i=1}^{N} T_i\left[\ln(2\pi) + \ln(\sigma_u^2 + \sigma_v^2)\right] - \frac{1}{2}\sum_{i=1}^{N}(T_i - 1)\ln\left(\frac{\sigma_v^2}{\sigma_u^2 + \sigma_v^2}\right) \\
& - \frac{1}{2}\sum_{i=1}^{N}\ln\left(\frac{\sigma_v^2 + T_i\sigma_u^2}{\sigma_u^2 + \sigma_v^2}\right) - N\ln\left(1 - \Phi\left(\frac{-\mu}{\sigma_u}\right)\right) - \frac{N}{2}\left(\frac{\mu}{\sigma_u}\right)^2 \\
& + \sum_{i=1}^{N}\ln\left(1 - \Phi\left(\frac{-\mu\sigma_v^2 + \sigma_u^2\sum_{t=1}^{T_i}(y_{it} - \alpha - x_{it}\beta - \sum\gamma_k D_{it})}{\sigma_u\sigma_v\sqrt{\sigma_v^2 + T_i\sigma_u^2}}\right)\right) \qquad (2) \\
& + \frac{1}{2}\sum_{i=1}^{N}\left(\frac{\mu\sigma_v^2 - \sigma_u^2\sum_{t=1}^{T_i}(y_{it} - \alpha - x_{it}\beta - \sum\gamma_k D_{it})}{\sigma_u\sigma_v\sqrt{\sigma_v^2 + T_i\sigma_u^2}}\right)^2 \\
& - \frac{1}{2\sigma_v^2}\sum_{i=1}^{N}\sum_{t=1}^{T_i}(y_{it} - \alpha - x_{it}\beta - \sum\gamma_k D_{it})^2
\end{aligned}$$

when outcome targets are not reached. It is likely, however, that this risk is lower with aggregate country data than in a micro household setting because due to fiscal constraints, governments tend to have limited opportunities to increase expenditures quickly when outcomes are deficient. Furthermore, we have tested for the robustness of the efficiency measures obtained to the choice of variables included in the estimation of the production frontier, and overall, the efficiency measures are highly robust to changes in specification.

5. Kumbhakar and Lovell (2000) show that efficiency rankings appear to be robust to the choice of the distribution.

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Consistent estimates are obtained by maximizing (2) with respect to the parameters α, β, γ_i, and the mean and variances of the u_i and v_{it} terms (μ, σ_u^2 and σ_v^2).

The measures of technical efficiency for each country are calculated as follows:

$$Efficiency_i = \frac{E(Y_{it}|X_{it}, D_i, u_i)}{E(Y_{it}|X_{it}, D_i, u_i = 0)} \qquad i = 1, \ldots, N \tag{3}$$

The observed outcome (expected value) given at a level of input use X_{it} in region D_i is depicted by the numerator $E(Y_{it}|X_{it}, D_i, u_i)$. The denominator, $E(Y_{it}|X_{it}, D_i, u_i = 0)$, represents the optimal (or best practice) outcome that can be attained with input use X_{it} in region D_i, which implies no inefficiency ($u_i = 0$).

The efficiency measures obtained from (3) are then used as dependent variables in a second step to analyze the determinants of efficiency. Linear models as presented in equation (4) are estimated in this analysis. Initially, each equation is estimated individually using the robust ordinary least squares (robust OLS) procedure with the Huber/White estimator of the variance covariance matrix used to ensure consistent standard errors. Next, the seemingly unrelated regression (SUR) method is used to estimate (4). The use of SUR enables us to test for differences in the impact of the exogenous variables on the efficiency in reaching better education and health outcomes. The second step regressions are as follows:

$$\begin{cases} Efficiency\ for\ Net\ Primary\ Educ_i = \delta_E + Z_i\theta_E + \zeta_{Ei} \\ Efficiency\ for\ Life\ Expectancy_i = \delta_L + Z_i\theta_L + \zeta_{Li} \end{cases} \qquad i = 1, \ldots, N \tag{4}$$

In (4), three independent variables and their squared values (to account for the possibility of non-linearity in the variables' impact on efficiency) are included in the vector Z_i. They are a country's level of bureaucratic quality, the degree of absence in corruption, and the level of urbanization. The variables are detailed in the next section.

Data and Results

A panel data set consisting of 76 countries over the period 1990 to 1998 is used. Two groups of variables are included: those used in estimating the production frontiers for health and education outcomes, and those used in the analysis for the determinants of efficiency.

The first group of variables consists of the two outcome measures (life expectancy and net primary enrolment rate) and the three input variables (per capita GDP level, per capita expenditure on education or health, and the adult literacy rate). The World Development Indicators (WDI) database at the World Bank is the primary data source. Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout her life. Net primary enrolment rate is the ratio of the number of children of official school age (as defined by the national education system) who are enrolled in primary education to the population of the corresponding official school age. As defined by the International Standard Classification of Education of 1976 (ISCED76), primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music. Per capita GDP (constant 1995 US$) was obtained from the WDI database. As in Evans et al. (2000), per capita health expenditures (constant 1995 US$) include both public and private expenditures. Per capita expenditures on education (constant 1995 US$) are calculated in a similar manner. Adult illiteracy measures the percentage of the population aged 15 years and above who cannot, with understanding, read and write a short, simple statement on their everyday life.

The second group of variables consists of institutional variables and data on urbanization. The institutional variables, corruption and bureaucratic quality indices, were obtained from the International Country Risk Guide (ICRG) published by Political Risk Services

TABLE 2-1: SUMMARY STATISTICS

	N	Mean	Min	Max	Std Dev
Variables used in the first stage regressions					
Life expectancy (years)	314	64.53	42.48	78.67	10.30
Net primary enrolment rate	301	83.57	20.40	104.50	18.19
GDP, per capita (constant 1995 US$)	507	3772.89	84.72	25684.75	5055.70
Health expenditure, per capita (constant 1995 US$)	314	211.49	3.27	1980.86	326.55
Education expenditure, per capita (constant 1995 US$)	301	149.42	2.16	1042.32	194.71
Adult literacy rate	507	75.27	11.40	99.80	21.94
Variables used in the second stage regressions					
Efficiency measure: Life expectancy (Model I)†	76	81.91	62.94	99.20	7.95
Efficiency measure: Life expectancy (Model II)†	76	81.65	62.28	99.15	8.28
Efficiency measure: Life expectancy (Model III)†	76	82.07	62.93	99.19	7.99
Efficiency measure: Net primary enrolment (Model I)†	66	73.60	33.11	97.88	12.10
Efficiency measure: Net primary enrolment (Model II)†	66	75.09	33.57	98.56	12.29
Efficiency measure: Net primary enrolment (Model III)†	66	74.81	33.46	98.27	12.35
Bureaucratic quality	86	50.55	16.67	87.04	16.11
Corruption	86	53.47	0.00	83.33	14.83
Urbanization	86	53.54	12.29	100.00	22.25

Source: ICRG and WDI; †Based on authors' estimation.

(PRS).[6] The ICRG indices are subjective assessments based on an analysis by a worldwide network of experts. To ensure coherence and cross country comparability, these indices are subject to a peer review process. The corruption index measures actual or potential corruption within the political system, which distorts the economic and financial environment, reduces government and business efficiency by enabling individuals to assume positions of power through patronage rather than ability, and introduces inherent instability in the political system. The bureaucratic quality index measures the strength and expertise of the bureaucrats and their ability to manage political alterations without drastic interruptions in government services or policy changes. For the corruption index, higher values indicate a decreased prevalence of corruption. For the bureaucratic quality index, higher values indicate the existence of greater bureaucratic quality. The urbanization data, from the World Bank's WDI database, refers to the urban population as a share of the total population. Summary statistics for all variables are presented in Table 2-1.

The production frontier estimation results for life expectancy and net primary enrolment are presented in Table 2-2. GDP per capita is found to have a positive and statistically significant impact on life expectancy, but not on net primary enrolment. Education expenditures per capita do not have a statistically significant impact on net primary enrolment, and the impact of health vanishes when GDP per capita is used as a control variable in the regression. This suggests that spending more is not necessarily the solution for better outcomes: spending better (i.e., improving efficiency) may be as important, if not more important. The adult literacy rate has a strong impact on both outcomes, whichever specification is used. A 10 percent increase in the adult literacy rate results in approximately 1.2 additional years for life expectancy, and a gain of roughly 6.1 to 6.6 percentage points for net primary enrolment. The year effects are small and lack statistical significance for both outcomes. The regional dummy variables are statistically significant for the health outcome, but for the education outcome the difference between some regions and Latin America is not statistically significant. More precisely, for life expectancy, all regions have higher production possibilities frontiers than Africa. For net primary

6. For details, see the Political Risk Services website at http://www.prsgroup.com/icrg/icrg.html

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TABLE 2-2: PRODUCTION FRONTIER COEFFICIENTS FOR HEALTH AND EDUCATION OUTCOMES

	Life expectancy			Net primary enrolment		
	Model I	Model II	Model III	Model I	Model II	Model III
Constant	61.29	61.57	61.10	58.37	59.50	59.92
	(58.86)	(49.28)	(55.48)	(11.30)	(12.22)	(11.45)
GDP,	0.0006	–	0.0006	0.0003	–	–0.0001
per capita	(4.12)		(4.96)	(0.56)		(–0.30)
(constant						
1995 US$)						
Expenditure,	–0.0007	0.0030	–	–0.0179	–0.0086	–
per capita	(–0.51)	(2.39)		(–1.79)	(–1.17)	
(constant						
1995 US$)						
Adult literacy	0.1203	0.1291	0.1235	0.6687	0.6125	0.6054
	(6.80)	(7.15)	(6.97)	(7.16)	(7.74)	(6.87)
Year	–0.0114	–0.0023	–0.0086	–0.0094	0.0251	–0.0109
	(–0.24)	(–0.07)	(–0.18)	(–0.06)	(0.18)	(–0.08)
Dummy						
Variables						
(Africa						
omitted)						
Asia	6.56	8.84	6.52	15.70	14.27	15.92
	(4.52)	(4.62)	(4.22)	(4.25)	(3.75)	(4.29)
Europe &	6.67	6.40	6.60	–6.73	–4.14	–3.76
Central Asia	(6.18)	(6.21)	(6.27)	(–0.98)	(–0.62)	(–0.54)
Latin America	8.48	8.44	7.79	0.65	3.81	3.43
& Caribbean	(6.92)	(6.88)	(7.60)	(0.12)	(0.78)	(0.63)
Industrial	8.79	10.51	8.82	14.79	10.27	6.63
Countries	(8.31)	(10.88)	(8.43)	(2.10)	(1.50)	(0.98)
Number of						
Observations	314	314	314	301	301	301

Source: Authors' estimation; (t-statistics).

enrolment, Asia and, for some specifications industrial countries, have higher frontiers than Africa, but the Europe and Central Asia, and the Latin America and Caribbean regions do not.

The estimated mean efficiency level for all countries in the sample is higher for life expectancy (81.9 percent) than for net primary enrolment (74.5 percent). This is essentially because some countries have very low levels of efficiency for schooling, and thereby the mean efficiency estimates are lower (the variance is also larger). Remember that in a country with an efficiency score of, say, 0.5, the level of life expectancy or net primary enrolment is only half of what it could be. There is thus ample scope for improvements in efficiency in order to reach education and health targets in the countries with low efficiency.

For life expectancy, we can compare our results to those of Evans et al. (2000). The best point of comparison is our findings for Model II, since Evans et al. do not include GDP per capita in their estimation. Like us, without controlling for per capita GDP, they find positive and statistically significant impacts of per capita expenditures on health and levels of education (measured by the average years of schooling in their paper) on life expectancy. The magnitude of the impacts is broadly similar to our results, although they find somewhat larger positive impacts of per capita

TABLE 2-3: CORRELATION BETWEEN HEALTH AND EDUCATION EFFICIENCY MEASURES

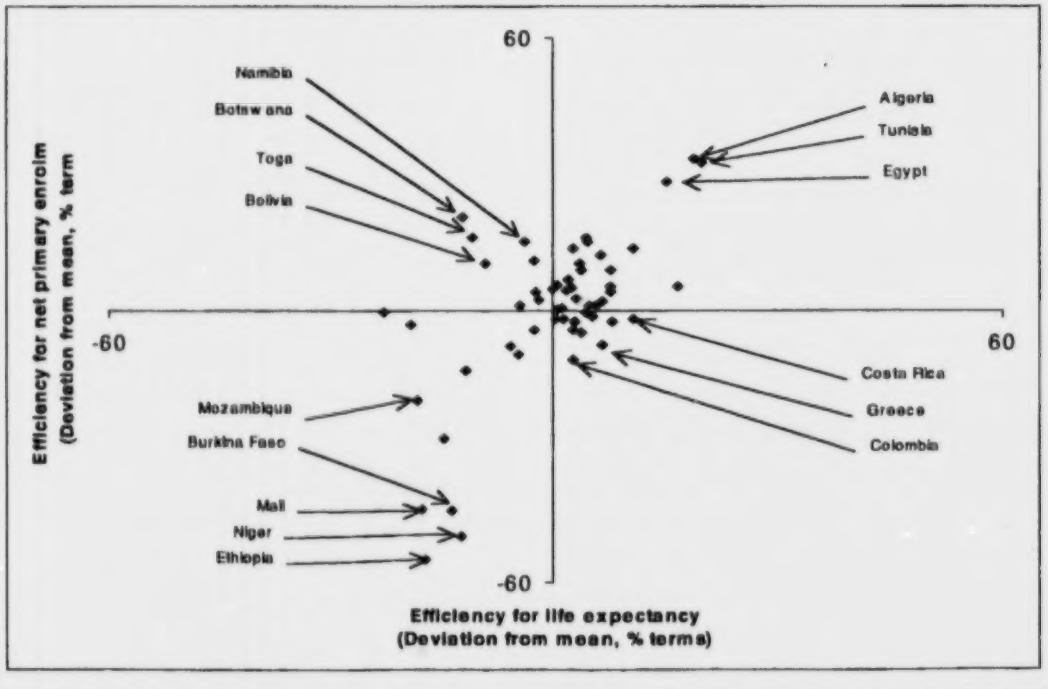
		Life expectancy			Net primary enrolment		
		Model I	Model II	Model III	Model I	Model II	Model III
Life expectancy	Model I	1					
	Model II	0.9796	1				
	Model III	0.9993	0.9789	1			
Net primary enrolment	Model I	0.6196	0.6046	0.6166	1		
	Model II	0.6239	0.6137	0.6185	0.9945	1	
	Model III	0.6274	0.6139	0.6229	0.9926	0.9978	1

Source: Authors' estimation.

health spending (but again, this may vanish when per capita GDP is used as an input in the production frontier estimation). What is more relevant for the second stage estimation discussed below is that the correlation between our efficiency measures at the country level and theirs is high, at 0.82. The correlations between the efficiency measures obtained with our three specifications in Table 2-2 are also high for both health and education (Table 2-3). This suggests that the results which form the basis of the second stage estimation are robust.

The countries with the lowest efficiency levels for life expectancy include Malawi, Zambia, Mozambique, Mali, Ethiopia, Tanzania, Burkina Faso and Niger. The countries with the lowest efficiency levels for schooling include Ethiopia, Niger, Burkina Faso, Mali, Tanzania, Mozambique and Ivory Coast. Figure 2-1 presents a scatter plot of the two efficiency measures (or more precisely,

FIGURE 2-1: CORRELATION BETWEEN EFFICIENCY MEASURES (USING MODEL II ESTIMATES)



Source: Authors.

TABLE 2-4: DETERMINANTS OF EFFICIENCY FOR HEALTH AND EDUCATION OUTCOMES (ROBUST OLS)

	Life expectancy			Net primary enrolment		
	Model I	Model II	Model III	Model I	Model II	Model III
Constant	0.4742	0.5193	0.4808	0.1987	0.2144	0.1989
	(7.06)	(8.11)	(7.13)	(0.90)	(0.95)	(0.89)
Bureaucratic	0.7060	0.5647	0.7002	0.5709	0.5268	0.5379
quality	(3.19)	(2.55)	(3.13)	(0.98)	(0.89)	(0.91)
Bureaucratic	–0.5973	–0.4564	–0.5987	–0.4243	–0.3541	–0.3744
quality^2	(–3.01)	(–2.26)	(–2.98)	(–0.81)	(–0.67)	(–0.71)
Corruption	–0.0148	–0.1025	–0.0276	–0.0359	–0.0503	–0.0635
(decrease in)	(–0.10)	(–0.79)	(–0.19)	(–0.06)	(–0.08)	(–0.10)
Corruption	0.0349	0.1278	0.0414	–0.0142	0.0102	0.0226
(decrease in)^2	(0.25)	(0.95)	(0.28)	(–0.03)	(0.02)	(0.04)
Urbanization	0.5289	0.4788	0.5351	1.394	1.399	1.474
	(3.23)	(3.00)	(3.25)	(3.87)	(3.77)	(4.01)
Urbanization^2	–0.3749	–0.2830	–0.3743	–1.083	–1.085	–1.158
	(–2.79)	(–2.10)	(–2.77)	(–3.92)	(–3.81)	(–4.09)
Number of Observations	76	76	76	66	66	66
R^2	0.36	0.43	0.36	0.39	0.40	0.41
F statistic	11.39	17.10	11.10	3.65	3.76	4.05

Source: Authors' estimation; (t-statistics).

of the country deviations from the mean level of efficiency in percentage terms) for the sample of countries for which both measures have been estimated (we used model II for the scatter plot, but the figure would be very similar for models I or III). Not surprisingly, there is a high degree of correlation between the two efficiency measures. But there are also some countries which have a better efficiency than the average for one indicator, and at the same time a lower efficiency than the average for the other indicator. For example, Botswana, Bolivia, Namibia and Togo do comparatively better than the average for net primary enrolment, but worse than the average for life expectancy. In contrast, Colombia, Costa Rica and Greece do comparatively better than the average for life expectancy, but worse for net primary enrolment.

Tables 2-4 (robust OLS estimation) and 2-5 (SUR estimation) present the results for the determinants of efficiency in improving education and health outcomes. We have three estimations, since we use the efficiency measures from the three models in Table 2-2. The results obtained with the three specifications are very similar, which is not surprising given the high correlation between the dependent variables. Urbanization has a strong positive and highly significant impact on efficiency for both net primary enrolment and life expectancy. On the other hand, bureaucratic quality has a positive impact only for life expectancy (the impact on net primary enrolment is not statistically significant). Furthermore, corruption does not appear to have a statistically significant impact on any of the two indicators. At the mean of the sample, controlling for corruption and urbanization, a 10 percentage point improvement in bureaucratic quality leads to an increase of about 0.4 percentage points in efficiency for life expectancy, while controlling for bureaucratic quality and corruption (at the sample mean), a 10 percentage point increase in urbanization leads to an increase of about 0.9 percentage points in life expectancy efficiency, and an increase of about 1.2 percentage points in net primary education efficiency. The values change slightly depending on the model chosen for the estimation.

TABLE 2-5: DETERMINANTS OF EFFICIENCY FOR HEALTH AND EDUCATION OUTCOMES (SUR ESTIMATION)

	Life expectancy			Net primary enrolment		
	Model I	**Model II**	**Model III**	**Model I**	**Model II**	**Model III**
Constant	0.6203	0.6562	0.6272	0.3327	0.3490	0.3342
	(5.08)	(5.29)	(5.12)	(1.69)	(1.77)	(1.72)
Bureaucratic	0.7034	0.5270	0.7037	0.7013	0.6880	0.7330
quality	(2.12)	(1.56)	(2.11)	(1.31)	(1.28)	(1.39)
Bureaucratic	−0.6052	−0.4152	−0.6132	−0.4983	−0.4493	−0.5059
quality^2	(−1.97)	(−1.33)	(−1.99)	(−1.01)	(−0.90)	(−1.03)
Corruption	−0.7158	−0.7138	−0.7356	−0.6587	−0.6940	−0.7230
(decrease in)	(−1.77)	(−1.74)	(−1.81)	(−1.01)	(−1.06)	(−1.12)
Corruption	0.6096	0.6216	0.6229	0.4427	0.4816	0.5063
(decrease in)^2	(1.74)	(1.75)	(1.77)	(0.79)	(0.85)	(0.91)
Urbanization	0.7134	0.6395	0.7193	1.458	1.452	1.508
	(4.18)	(3.69)	(4.20)	(5.30)	(5.26)	(5.55)
Urbanization^2	−0.4959	−0.3943	−0.4947	−1.132	−1.128	−1.175
	(−3.33)	(−2.60)	(−3.30)	(−4.71)	(−4.68)	(−4.95)
Number of Observations	56	56	56	56	56	56
R^2	0.48	0.51	0.49	0.48	0.49	0.51
χ^2 statistic	52.72	59.38	53.02	51.16	53.57	57.57

Source: Authors' estimation; (t-statistics).

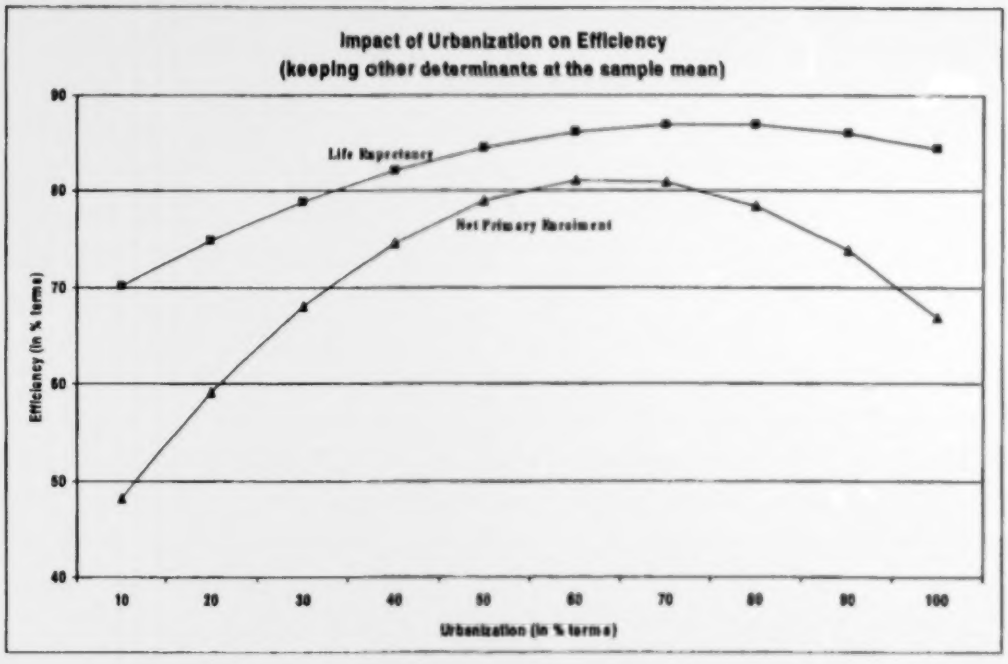
One reason for the importance of urbanization may be related to lower per capita costs of providing health and education services. But there could also be other reasons why efficiency would be better in urban areas.[7] Monitoring performance may be easier in urban areas (better access by supervisors, possibly more communications among parents/patients and staff, given not only proximity but also ease of contact). Attracting quality inputs, especially teachers and health personnel, may also be easier in an urban setting. Another possibility, at least for education, could be that urban living provides better reinforcement for good educational performance and student completion, thanks to better access to reading material and jobs requiring higher levels of schooling, more social encouragement for girls to pursue options requiring schooling, etc.

The impact of urbanization and a better bureaucracy are decreasing at the margin (the coefficients for the quadratic terms are negative). Yet, even when the quality of the bureaucracy reaches a high value (the maximum value is 100 percent), the gains for life expectancy still tend to be positive, albeit smaller. The same is true for the impact of urbanization on life expectancy. However, for very high rates of urbanization, further increases in urbanization may lead to a decrease in efficiency for net primary enrolment (see Figure 2-2; unless urbanization reaches extremely high levels however, the decrease is not statistically significant).

Table 2-6 presents test results used to determine if the impacts of corruption, bureaucratic quality, and urbanization are the same for the efficiency in reaching net primary education and life expectancy outcomes. A test that the joint impact of the three variables and their quadratic terms is the same for both efficiency measures cannot be rejected at a 5 percent level of significance for all three models (P-values 0.142, 0.068 and 0.077 for Models I, II and III respectively). A χ^2 test cannot reject the hypothesis that bureaucratic quality affects the two efficiency measures in a similar man-

7. These reasons were suggested to us by Christine Fallert Kessides.

FIGURE 2-2: IMPACT OF URBANIZATION ON EFFICIENCY MEASURES (USING MODEL II ESTIMATES)



Source: Authors.

ner (P-values 0.612, 0.552 and 0.450 for Models I, II and III respectively), and a similar conclusion holds for corruption (P-values 0.493, 0.470 and 0.569 for Models I, II and III respectively). However, the impact of urbanization on the two efficiency measures is found to be different at a 5 percent level of significance (P-values 0.026, 0.010 and 0.016 for Models I, II and III respectively). As mentioned earlier, this may be due to the fact that for high rates of urbanization, an increase in urbanization seems to lead to a loss in efficiency for net primary enrolment (this is not observed for life expectancy).

Conclusion

Using a worldwide panel data set for the period 1990–98, we have measured the efficiency of countries in improving health and education outcomes for their population. The method relies on the estimation of production functions for net primary enrolment and life expectancy using stochastic frontier methods. The inputs used in the estimation are per capita GDP, per capita expenditures on the respective social sectors, and the adult literacy rate. The production frontiers are allowed to vary by region. The results suggest large differences among countries (and among regions) in efficiency, and a substantial correlation in the efficiency measures obtained for the two indicators. Still, there are some countries which have a better efficiency than average for one indicator, and a lower efficiency than average for the other.

An analysis of the determinants of the efficiency measures suggests that bureaucratic quality and urbanization both have strong positive impacts on efficiency, albeit decreasing at the margin. In contrast, corruption does not appear to have the same impact. The policy conclusion of the paper is that while better indicators can be achieved through an expansion in the use of inputs (while keeping efficiency levels constant), an improvement in efficiency levels (while keeping input

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TABLE 2-6: χ^2 TESTS TO STUDY THE IMPACT OF DETERMINANT VARIABLES ON EFFICIENCY

Test:	Do the determinant variables jointly have a similar impact on education efficiency vis a vis health efficiency		
	H_0: $\theta_E = \theta_L$		
	H_a: not all equal		
	Model I	**Model II**	**Model III**
	χ^2_6 statistic = 9.61	χ^2_6 statistic = 11.74	χ^2_6 statistic = 11.41
	P-value = 0.1419	P-value = 0.0679	P-value = 0.0766
Test:	Does bureaucratic quality have a similar impact on education efficiency vis a vis health efficiency		
	H_0: $\theta_{E,\text{Bureaucratic Quality}} = \theta_{L,\text{Bureaucratic Quality}}$		
	H_a: not all equal		
	Model I	**Model II**	**Model III**
	χ^2_2 statistic = 0.98	χ^2_2 statistic = 1.19	χ^2_2 statistic = 1.60
	P-value = 0.6115	P-value = 0.5515	P-value = 0.4497
Test:	Does corruption have a similar impact on education efficiency vis a vis health efficiency		
	H_0: $\theta_{E,\text{Corruption}} = \theta_{L,\text{Corruption}}$		
	H_a: not all equal		
	Model I	**Model II**	**Model III**
	χ^2_2 statistic = 1.42	χ^2_2 statistic = 1.51	χ^2_2 statistic = 1.13
	P-value = 0.4928	P-value = 0.4699	P-value = 0.5689
Test:	Does urbanization have a similar impact on education efficiency vis a vis health efficiency		
	H_0: $\theta_{E,\text{Urbanization}} = \theta_{L,\text{Urbanization}}$		
	H_a: not all equal		
	Model I	**Model II**	**Model III**
	χ^2_2 statistic = 7.30	χ^2_2 statistic = 9.16	χ^2_2 statistic = 8.23
	P-value = 0.0260	P-value = 0.0103	P-value = 0.0164

Source: Authors' estimation.

use constant) is clearly an alternative strategy. Some of the improvement in efficiency may come quasi automatically with urbanization (perhaps because it is cheaper to provide access to school and health centers in urban areas). But efforts to improve the bureaucratic quality of countries would also lead to gains in efficiency. In contrast, a decrease in corruption might not lead to a dramatic increase in the efficiency measures for the two indicators.

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CHAPTER 3

MEASURING AND EXPLAINING THE IMPACT OF PRODUCTIVE EFFICIENCY ON ECONOMIC DEVELOPMENT

Ruwan Jayasuriya and Quentin Wodon

Introduction

Measuring economic performance is an issue not only of academic interest but also of practical concern. Numerous cross-country studies, that use GDP levels or growth rate as a yardstick for economic performance, have found that conventional factors used to determine output, such as physical and human capital along with labor force size, do not fully explain production. Although the results are somewhat sensitive to the specification of the model estimated, measures of market distortion, macroeconomic environment, political stability, research and development, and the depth of financial markets have all been found to have an impact on economic development (for reviews, see among others Barro and Sala-i-Martin, 1995; Sala-i-Martin, 1997; Solow, 2000; Aron, 2000; and Easterly, 2001).

The focus has recently shifted to the quality of public and private institutions, and the quality of markets in explaining economic performance in cross-country analyses (e.g., Brunetti et al., 1998, Hall and Jones, 1999, and Keefer and Knack, 1997).[8] Although the institutional framework and market structure of a country measure different aspects, they have much overlap. These factors can be measured by the quality of bureaucracy, pervasiveness of corruption, rule of law, risk of appropriation, contract repudiation, political environment, civil liberties and etc., and should have an impact on production and allocation decisions. Market and institutional deficiencies may distort public and private decision making, and lead entrepreneurs to undertake wasteful rent-seeking activities that divert time and resources from productive activities, thereby preventing firms from adjusting effectively to technological change. Weak institutions and market structures may result in

8. Brunetti, Kisunko and Weder (1998), using firm-level data from a private sector survey in 73 countries to gauge the environment faced by local businesses, find that the institutional framework is crucial in explaining differences in economic performance. Hall and Jones (1999) also find that good institutions and sound policies help for economic development by supporting entrepreneurial activities, capital accumulation, invention, skill acquisition and technology transfers. Aiming to explain why poor countries are falling behind rather than catching up with wealthy nations, Keefer and Knack (1997) also conclude deficient institutions and government policies lead to poor performance.

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non-optimal input use and also in inefficient use of employed resources. In developing countries, where the potential for industrialization is higher, the inability of firms to fully benefit from low-cost access to advanced technology from overseas and better returns to scale (relative to developed countries) may be especially damaging to development.

Macroeconomic environment is another area that has received much attention in studying country-level economic performance. The inflation rate has been widely used as a proxy for the prevailing macroeconomic conditions in a country, and the black market premium has been used to a lesser extent. Numerous theoretical studies have also focused on the costs of inflation (for survey see Briault 1995 and Temple 2000). These analyses have shown that businesses and households perform poorly when inflation is high and unpredictable. While empirical studies have found some support for the harmful effects of inflation, this evidence is not overwhelming: while inflation in excess of 100% per year has been found to inhibit economic development, the impact of moderate inflation is less clear.

It is important to emphasize the role of urbanization in studying economic performance. While this variable has been largely omitted in previous models, it turns out in our results to have a key positive impact on productive efficiency. The reasons for this may be diverse.[9] Cities strive on learning and innovation due to universities, research centers, and the presence of other firms, thereby facilitating spill-over effects (Glaeser et al., 1992; Adams, 2001). Personal contacts remain important in the digital age, and they are easier to maintain in cities (Wheeler et al. 2000, Glaeser, 1998, Lall and Ghosh, 2002). Cities lead to economies of scale, encourage the division of labor, and provide a better environment for matching skills with needs (Quigley, 1998; Mills, 2000; Ciccone and Hall, 1996). Cities also make it easier to provide access to education, health, and infrastructure, not only because costs tend to be lower, but also because competition in service provision is greater.

One limitation of most cross-country studies is that, in the regressions that focus on the determinants of GDP levels or growth rates, all the independent variables are lumped together. Yet some independent variables are different from others. While variables such as physical capital, human capital, and labor are genuine inputs in the production process, others such as the quality of institutions, market structures, or macroeconomic management are not inputs, but rather conditions that facilitate production. This paper takes this distinction seriously to propose an analysis of the determinants of economic performance in two steps. Initially, we measure how efficient countries are in producing output. Thereafter, we analyze the determinants of efficiency using a range of macroeconomic, market quality and institutional variables, as well as the level of urbanization.

We estimate a production frontier in the first step by relying on an extension of the error components model of Aigner et al. (1977) proposed by Battese and Coelli (1992, 1995). Similar to the augmented neoclassical model, we use physical capital, human capital and labor force size as production inputs. The production frontier, given input use, depicts the optimal output level, while country-level productive efficiency is measured by comparing actual GDP to the corresponding optimal outcome. In the second step, the impacts of the institutional structure, macroeconomic stability, the reliance on market mechanisms in the production process and allocation of resources (market quality index), and the level of urbanization on productive efficiency are estimated.

The rest of the paper is organized as follows. The next section presents the maximum likelihood estimation (MLE) technique used in estimating the production frontiers, as well as the procedure used to analyze the determinants of productive efficiency. A description of the data used and their sources can be found in the third section. The fourth section presents the empirical results. A conclusion follows.

Methodology

We use a production possibilities frontier framework to determine best practice outcomes (given input use) and calculate country-level productive efficiency in reaching these GDP benchmarks. World and regional productive efficiency benchmarks for the periods 1980–84, 1985–89, 1990–94

9. For a review of the role of cities in development, see World Development Report 2003: Dynamic Development in A Sustainable World, Chapter 6.

and 1995–98 are also estimated that can be used in cross-country comparisons over time. In a secondary analysis, that uses the estimated productive efficiency measures, we develop a framework to quantify the impact of the institutional structure, market quality, macroeconomic environment and urbanization on country performance in reaching optimal GDP outcomes.

Let Y_{it} represent real GDP for country i at time t. The inputs used for production are depicted by X_{it} and the log-log specification is used in the estimation. The inputs used are physical capital, human capital (years of schooling) and number of workers. To enable the production frontier to vary by region, we include dummy variables for Asia (D_{ASIA}), Latin America and the Caribbean (D_{LAC}), Middle East and North Africa (D_{MENA}) and North America and Europe (D_{NAW}), with Africa as the omitted region. The production frontier estimated for time period T is:

$$\ln Y_{it} = \alpha + \ln X_{it}\beta + \gamma_1 D_{ASIA} + \gamma_2 D_{LAC} + \gamma_3 D_{MENA} + \gamma_4 D_{NAW} + (v_{it} - u_i) \qquad i = 1, \ldots, N \qquad (1)$$

Four separate production frontiers are estimated for 1980–84, 1985–89, 1990–94 and 1995–98. A pooled estimation for 1980–98 is also provided. The estimation of the model is in the spirit of Battese and Coelli (1992, 1995) and uses a maximum likelihood program by Coelli (1996). The error term, $(v_{it} - u_i)$, in (1) consists of two components. The random noise term, $v_{it} \sim N(0, \sigma^2_v)$, accounts for random shocks and measurement errors. This term is independent of the non-negative component, $u_i \sim |N(\mu, \sigma^2_u)|$, which depicts deviation from the optimal (best practice) outcome and is used to derive the measures of efficiency.[10] N denotes the number of countries in the sample and $\Phi(.)$, depicted in (2), is the cumulative standard normal distribution function. The log likelihood function incorporating all the information derived from the distributional assumptions on the inefficiency term (u_i) and the random noise (v_{it}) for time period T is:

$$\begin{aligned}
\ln(L) = &-\frac{1}{2}\sum_{i=1}^{N}\left[\ln(2\pi) + \ln(\sigma_u^2 + \sigma_v^2)\right] - N\ln\left(1 - \Phi\left(\frac{-\mu}{\sigma_u}\right)\right) - \frac{N}{2}\left(\frac{\mu}{\sigma_u}\right)^2 \\
&+ \sum_{i=1}^{N}\ln\left(1 - \Phi\left(\frac{-\mu\sigma_v^2 + \sigma_u^2(\ln y_{it} - \alpha - \ln x_{it}\beta - \sum \gamma_i D_{it})}{\sigma_u\sigma_v\sqrt{\sigma_v^2 + \sigma_u^2}}\right)\right) \\
&+ \frac{1}{2}\sum_{i=1}^{N}\left(\frac{\mu\sigma_v^2 - \sigma_u^2(\ln y_{it} - \alpha - \ln x_{it}\beta - \sum \gamma_i D_{it})}{\sigma_u\sigma_v\sqrt{\sigma_v^2 + \sigma_u^2}}\right)^2 \\
&- \frac{1}{2\sigma_v^2}\sum_{i=1}^{N}(\ln y_{it} - \alpha - \ln x_{it}\beta - \sum \gamma_i D_{it})^2
\end{aligned} \qquad (2)$$

Consistent estimates for the production frontier parameters are obtained by maximizing (2) with respect to α, β, γ_i, and the mean and variances of the u_i and v_{it} terms (μ, σ^2_v and σ^2_u). The resulting parameter estimates for production frontiers can be found in Table 3-2.

The productive efficiency measure of country i at time period T is calculated as follows:

$$Efficiency_{it} = \frac{E(Y_{it}|X_{it}, D_i, u_i)}{E(Y_{it}|X_{it}, D_i, u_i = 0)} \qquad i = 1, \ldots, N \qquad (3)$$

In (3), the numerator, $E(Y_{iT} \mid X_{iT}, D_i, u_i)$, depicts the observed outcome given at a level of input use X_{iT} in region D_i. The denominator, $E(Y_{iT} \mid X_{iT}, D_i, u_i = 0)$, represents the optimal (or best

10. Kumbhakar and Lovell (2000) show that efficiency rankings appear to be robust to the choice of the distribution.

practice) outcome that can be attained with input use X_{it} in region D_i, which implies no inefficiency ($u_i = 0$).

Using the panel of efficiency measures obtained from (3), the second step consists of analyzing the determinants of efficiency. The independent variables include measures of each country's institutional framework (indices on bureaucratic quality, prevalence of corruption, contract enforcement/quality and rule of law), macroeconomic stability (inflation rate and black market premium), reliance on market mechanisms in the production process and allocation of resources (market quality index), and the level of urbanization. Representing these variables by the vector Z_{it}, the model is:

$$\textit{Efficiency Measure for } GDP_{it} = \delta_0 + Z_{it}\theta + \tau_t + \zeta_{it} \qquad i = 1, \ldots, N \;\&\; t = 1, \ldots, T \quad (4)$$

The model presented in (4) is estimated using fixed effects and random effects methodologies. A Hausmann test is then used to select the appropriate model. We account for possible endogeneity in some of the institutional variables (better efficiency could lead to improvements in the institutional framework) by estimating (4) using the instrumental variables (IV) approach. Lagged values of the institutional variables, other measures of market quality and civil liberties are used as the instruments. A description of the data used and their sources can be found in the next section.

Data

Data for 89 countries during the 1980–98 period is used in this study. All variables are averaged over five year intervals (1980–84, 1985–89, 1990–94 and 1995–98) to reduce the impact of short-run fluctuations on the parameters estimated (i.e. capture long term effects). There are two groups of variables: those used in estimating the production frontiers, and those used in explaining country efficiency in producing output.

The first group of variables consists of real Gross Domestic Product (GDP), real domestic capital stock (CAP), average years of schooling (used as a proxy for a country's stock of human capital), and the total number of workers. The Penn World Tables (PWT6.0) compiled by Summers and Heston is the source for the real GDP and total number of workers data. The CAP data was constructed by Kraay et al. (2001). The human capital data was obtained from the educational attainment database compiled by Barro and Lee (2000). Real GDP is in constant purchasing power parity (PPP) dollars (chain index; expressed in international prices, base 1996) and a country's employment level is given by the number of workers (in thousands). CAP is in constant PPP dollars (base 1990) and accounts for domestic capital stock, cross-border claims on equity, and cross-border borrowing and lending in its construction (Kraay et al., 2001).

The second group of variables consists of country level data on the institutional framework, macroeconomic stability, market quality and urbanization. Indices on bureaucratic quality, rule of law, prevalence of corruption, contract enforcement and civil liberties are used to proxy a country's institutional framework. Data on the first four indices were obtained from the International Country Risk Guide published by Political Risk Services (PRS).[11] The civil liberties index was constructed using the Freedom House's Freedom in the World Survey.[12] Data on the structure of the economy and use of markets variable used to measure a country's market quality was obtained from the Economic Freedom of the World 2001 annual report published by The Fraser Institute.[13] The inflation rate and the black market premium (BMP) are used as proxies for a country's macroeconomic stability. Data on the inflation rate, BMP and urbanization were obtained from the World Development Indicators (WDI) database at the World Bank.

11. For details, see the Political Risk Services website: http://www.prsgroup.com/icrg/icrg.html
12. Detailed information on the Freedom in the World Survey and data can be downloaded from the Freedom House website: http://www.freedomhouse.org
13. Economic Freedom of the World: 2001 annual report and data retrieved from The Fraser Institute website: http://www.freetheworld.com

The ICRG indices are subjective assessments based on an analysis by a worldwide network of experts. To ensure coherence and cross country comparability, these indices are subject to a peer review process. The bureaucratic quality index measures the strength and expertise of the bureaucrats and their ability to manage political alterations without drastic interruptions in government services or policy changes. Higher values of this index indicate greater bureaucratic quality. The rule of law index assesses the strength and impartiality of the legal system and the popular observance of the law. Higher values of this index indicate more effective enforcement and greater adherence to the law. The corruption index measures actual or potential corruption within the political system, which distorts the economic and financial environment, reduces government and business efficiency by enabling individuals to assume positions of power through patronage rather than ability, and introduces inherent instability in the political system. Higher values of this index indicate a decreased prevalence of corruption. The quality of contracts is depicted by the contract enforcement variable, with higher values indicating better outcomes. The civil liberties index measures freedom of expression, assembly, association, and religion along with the presence of an effective system of governance, and an established and equitable system of rule of law. Higher values of the civil liberties index indicate better outcomes. The five indices mentioned use different rating systems, but they have been normalized to take values between 0 and 100 in this study (with higher values indicating better outcomes).

Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services. The black market premium is depicted by BMP. The structure of the economy and use of markets variable is used as a proxy to measure a country's market quality. The share of the public sector in industry and investment, use of price controls and top marginal tax rates are incorporated in this index. This index has been normalized to take values between 0 and 100 with higher values indicating the existence of more effective market structures. Urbanization data refers to the urban population as a share of the total population. Summary statistics for all variables are presented in Table 3-1.

Empirical results

The parameter estimates for the production frontiers are presented in Table 3-2. A country's real capital stock (CAP) and the number of workers have a positive and statistically significant impact on GDP levels. A 10 percent increase in capital stock leads to a percentage increase in GDP of 5.3 percent to 6.2 percent. A similar percent increase in the number of workers results in a slightly smaller percentage increase in GDP of 4.0 percent to 4.5 percent. A 10 percent increase in human capital results in a smaller increase in GDP (1.1 percent at most, according to the pooled data), and the impact lacks statistical significance. The regional dummy variables tend to be statistically significant, both in the period and the pooled models, with several regions typically having higher production possibilities frontiers than Africa, the excluded region.

Table 3-3 contains results pertaining to the impact of the institutional framework, macroeconomic stability, market quality and urbanization on a countries' productive efficiency. Both fixed effects and random effects models were estimated. The instrumental variables (IV) method is also used to estimate a fixed effects model in which all institutional variables are instrumented using lagged values of the independent variables and measures of market quality, and civil liberties (this is done to control for potential endogeneity of the institutional variables to the productive efficiency of countries). In Table 3-3, only the fixed effects model results are reported because χ^2 tests (Hausmann tests) conducted to choose between fixed effects and random effects models supported the use of the fixed effects model for both formulations.[14] In both models, F-tests strongly reject the hypothesis that country-specific effects have zero impact on efficiency (p-value 0.000 in both formulations), which is not very surprising.

14. The Hausmann tests yielded for the panel fixed effects a χ^2_9 statistic of 18.61 (p-value = 0.029), and for the panel fixed effects estimation using IV a χ^2_9 statistic of 23.38 (p-value = 0.005).

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TABLE 3-1: SUMMARY STATISTICS

	N	Mean	Min	Max	Std Dev
Variables used in the first stage regressions					
GDP (constant 1996 PPP dollars; in billions)	337	299.86	1.18	8013	832.83
Capital stock (constant 1990 PPP dollars; in billions)	337	584.56	0.30	14350	1745.42
Years of schooling	337	5.05	0.37	12.18	2.90
Workers (in 1000s)	337	22,239	121.34	738,590	80,796
Variables used in the second stage regression					
Efficiency measures: 1980–84 period†	82	74.41	28.92	97.30	18.31
Efficiency measures: 1985–89 period†	83	74.29	29.70	99.96	17.38
Efficiency measures: 1990–94 period†	85	81.28	37.27	94.58	11.56
Efficiency measures: 1995–98 period†	87	83.47	51.65	94.10	8.68
Efficiency measures: 1980–98 period (pooled)†	89	81.18	40.33	95.33	12.53
Bureaucratic quality index	253	61.84	12.50	100.00	26.43
Corruption index	253	60.62	0.00	100.00	24.28
Contract enforcement/quality index	253	70.90	24.00	100.00	20.84
Rule of law index	253	62.68	13.33	100.00	26.80
Inflation	253	23.51	0.49	432.78	43.32
Black market premium (BMP)	253	15.70	−9.93	189.60	28.55
Market quality index	253	40.12	0.00	92.00	19.12
Urbanization	253	57.45	9.62	100.00	22.41
Civil liberties index	253	65.07	0.00	100.00	28.00

Source: Penn World Tables (PWT6.0), Barro and Lee (2000), Kraay et al. (2001), ICRG, WDI, The Fraser Institute and Freedom House; †Based on authors' estimation; *Note:* the pooled efficiency measures are not used in the second stage regressions.

TABLE 3-2: PRODUCTION FRONTIER COEFFICIENTS

	(1980–84)	(1985–89)	(1990–94)	(1995–98)	Pooled (1980–98)
Constant	1.0344	−0.6561	0.4028	0.5377	0.8195
	(2.20)	(−2.27)	(0.77)	(0.93)	(1.48)
Log(Capital stock)	0.5253	0.6170	0.5471	0.5381	0.5282
	(14.94)	(33.60)	(15.53)	(14.03)	(14.04)
Log(Years of schooling)	0.0757	0.0470	0.0691	0.0423	0.1114
	(1.72)	(1.56)	(1.26)	(0.71)	(1.47)
Log(Workers)	0.4491	0.3968	0.4336	0.4501	0.4511
	(11.14)	(18.45)	(11.62)	(11.73)	(11.49)
Dummy variables	−0.1592	−0.2191	0.0517	0.0925	−0.0194
(Africa omitted) Asia	(−1.54)	(−2.59)	(0.44)	(0.74)	(−0.21)
Latin America	0.0142	0.0215	0.1982	0.1975	0.1280
& Caribbean	(0.19)	(0.44)	(2.02)	(1.92)	(1.66)
Middle East &	0.5567	0.0924	0.4773	0.5424	0.4292
North Africa	(6.42)	(1.58)	(3.66)	(4.33)	(4.00)
North America	−0.0073	−0.1762	0.2204	0.3991	0.1889
& Europe	(−0.07)	(−1.29)	(1.57)	(2.87)	(1.69)
Number of observations	82	83	85	87	89

Source: Authors' estimation; t-statistics in parenthesis.

TABLE 3-3: DETERMINANTS OF PRODUCTIVE EFFICIENCY (1980–84, 1985–89, 1990–94 AND 1995–98)

Dependent variable: Efficiency measures	**Fixed Effects**	**Fixed Effects (IV)**
Constant	0.3213	0.3284
	(2.81)	(2.26)
Bureaucratic quality index	0.1073	0.0144
	(1.08)	(0.05)
Corruption index	–0.0909	–0.1156
	(–1.12)	(–0.67)
Contract enforcement/quality index	0.0723	–0.0374
	(0.89)	(–0.25)
Rule of law index	0.1628	0.3530
	(2.28)	(1.85)
Inflation	–0.0389	–0.0416
	(–2.08)	(–1.98)
Black market premium (BMP)	–0.0041	0.0011
	(–0.14)	(0.03)
Market quality index	–0.0295	–0.0383
	(–0.47)	(–0.50)
Urbanization	0.5849	0.6418
	(2.74)	(2.51)
Period	0.0007	0.0012
	(0.07)	(0.11)
R^2	0.3140	0.2960
Number of observations	253	241
Test: All fixed-effects (country-specific) variables equal zero		
H_0: $\tau_i = 0$ for all i	$F_{(73,170)} = 5.72$	$F_{(70,161)} = 5.40$
H_a: not all zero	P-value = 0.000	P-value = 0.000
Test: The institutional framework has no impact on efficiency		
H_0: $\theta_{Bur\ Quality} = \theta_{Corruption} = \theta_{Contract} = \theta_{Law} = 0$	$F_{(4,170)} = 3.35$	χ^2_4 stat = 11.16
H_a: not all zero	P-value = 0.011	P-value = 0.025
Test: Macroeconomic stability has no impact on efficiency		
H_0: $\theta_{Inflation} = \theta_{BMP} = 0$	$F_{(2,170)} = 2.20$	χ^2_2 stat = 3.92
H_a: not all zero	P-value = 0.114	P-value = 0.141
Test: Market quality has no impact on efficiency		
H_0: $\theta_{Market} = 0$	$F_{(1,170)} = 0.22$	χ^2_1 stat = 0.25
H_a: not zero	P-value = 0.639	P-value = 0.618
Test: Urbanization has no impact on efficiency		
H_0: $\theta_{Urbanization} = 0$	$F_{(1,170)} = 7.48$	χ^2_1 stat = 6.28
H_a: not zero	P-value = 0.007	P-value = 0.012

Source: Authors' estimation; t-statistics in parenthesis.

Consider first the results with the standard fixed effects model. A 10 percent increase in the rule of law index would lead to a 1.6 percent increase in efficiency. The impact of the bureaucratic quality and contract enforcement indices are positive but lack statistical significance, while the corruption index is negative and also lacks statistical significance. Still, as a whole, the hypothesis that the institutional framework (i.e. the four institutional variables taken jointly) has no impact on productive efficiency is rejected at a high significance level (p-value 0.011). The inflation rate and the black market premium (BMP) are used as proxies for macroeconomic stability. A 10 percent increase in the inflation rate reduces efficiency by 0.4 percent while the impact of the BMP is not statistically significant. The market quality parameter is negative and lacks statistical significance. Urbanization, on the other hand, has a strong and statistically significant impact on efficiency, with a 10 percent increase in urbanization leading to a 5.8 percent increase in productive efficiency. The test for zero impact of urbanization on productive efficiency is also rejected at a high significance level (p-value 0.007).

When using instrumental variables, the impacts of urbanization and inflation remain statistically significant with urbanization still having the largest impact by far. The rule of law impact has the appropriate sign and is statistically significant at a lower level (p-value 0.064). A 10 percent increase in urbanization now leads to a 6.4 percent increase in productive efficiency, while a 10 percent rise in inflation causes productive efficiency to fall by 0.4 percent. The efficiency impacts of these three parameters are higher when estimated using the IV method. Similar to the fixed effects formulation without IV, the test for the institutional framework (i.e. the four institutional variables taken jointly) having no impact on productive efficiency is rejected (p-value 0.025) while the test for zero impact of urbanization on productive efficiency is also rejected (p-value 0.012).

As mentioned in the introduction, there may be many different reasons for the positive impact of urbanization on productive efficiency. It may be easier to innovate in cities due to the presence of universities, research centers, and other firms in the same area of work (Glaeser et al., 1992; Adams, 2001). Cities facilitate personal contacts and informal interactions, which have been proven to be important for performance (Wheeler et al. 2000, Glaeser, 1998, Lall and Ghosh, 2002). They also encourage the division of labor, and a better functioning of the labor market for matching skills with needs, and providing rewards for investment by workers in knowledge (Quigley, 1998; Mills, 2000; Ciccone and Hall, 1996). Finally, cities have better services in education, health, and infrastructure, due to cost advantages over rural areas and higher competition among service providers. While our results do not suggest which factors among these are more important, they point to the need for continued research in these areas.

Conclusion

There is an extensive literature on identifying and measuring factors that improve economic performance, as measured by GDP levels and growth rates, using cross-country analyses. In contrast to previous studies, we propose an approach that makes an explicit distinction between inputs used in production (physical capital, human capital, labor and etc.), and conditions that facilitate the production process (institutional framework, market quality, macroeconomic policy and etc.).

Initially, we estimate a production possibilities frontier that depicts optimal output for different levels of input use, and calculate efficiency by comparing actual output levels with their corresponding optimal outcomes. Similar to pervious growth studies, our results indicate positive relationships, that are statistically significant, between production and levels of physical capital and workers employed. The impact of years of schooling is positive in all cases, but lacks statistical significance.

These productive efficiency measures are then used in a secondary analysis to study the impact of the institutional framework, quality of markets, macroeconomic environment and level of urbanization on productive efficiency. Our findings indicate that the level of urbanization, a variable that has been overlooked in many empirical studies, is a key determinant of a country's productive efficiency. Rule of law and inflation are also shown to have a notable impact on productive efficiency.

We also account for possible endogeneity in some of the institutional variables (better efficiency could lead to improvements in the institutional framework) by using the instrumental variables (IV) estimation method in our secondary analysis. The IV results are similar to those obtained without using instrument variables, with urbanization, rule of law and inflation all having a larger impact on productive efficiency when endogeneity is accounted for in the estimation.

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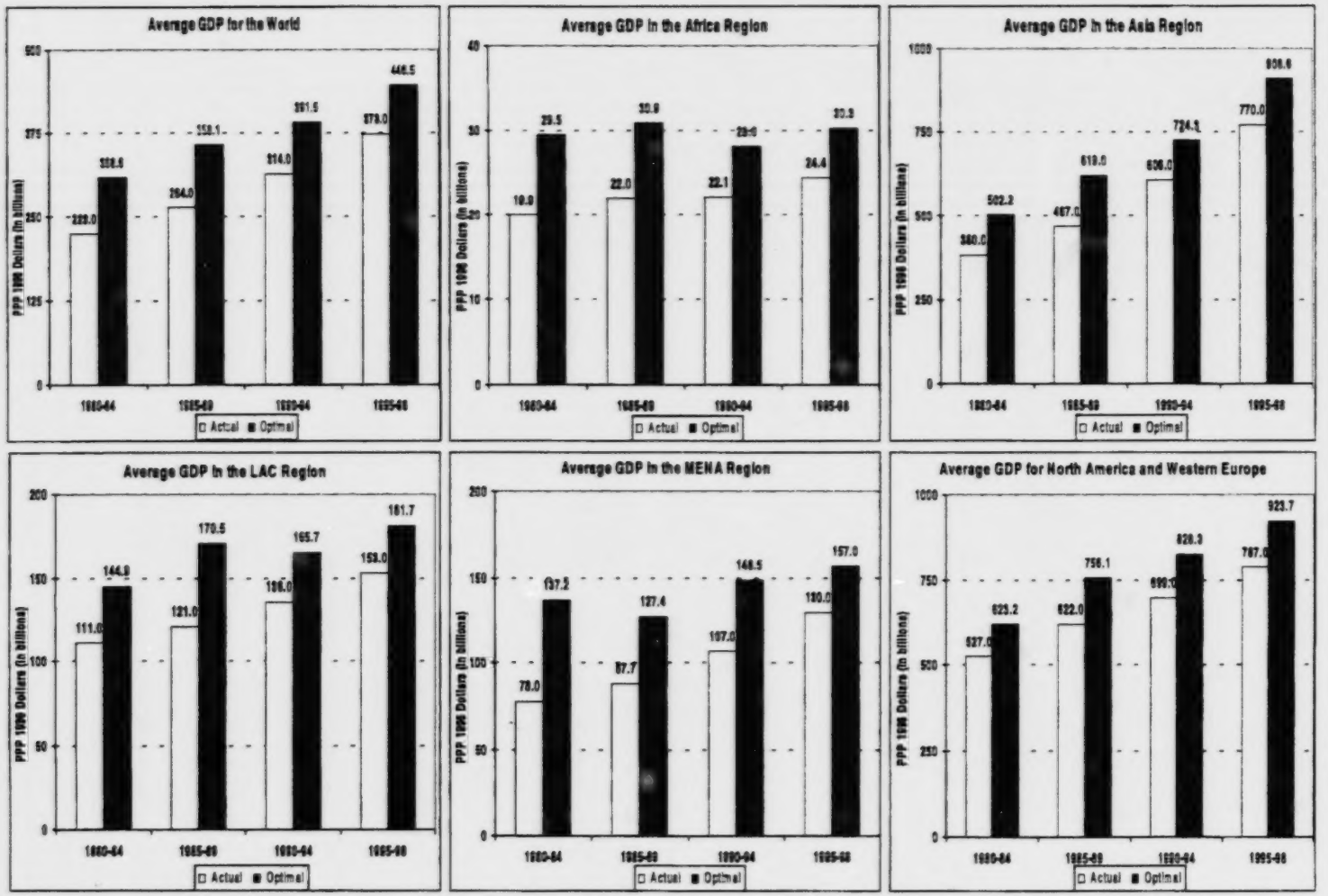
APPENDIX FIGURE A3-1: OPTIMAL AND ACTUAL AVERAGE GDP LEVELS BY REGIONS AND THE WORLD



Source: Authors.

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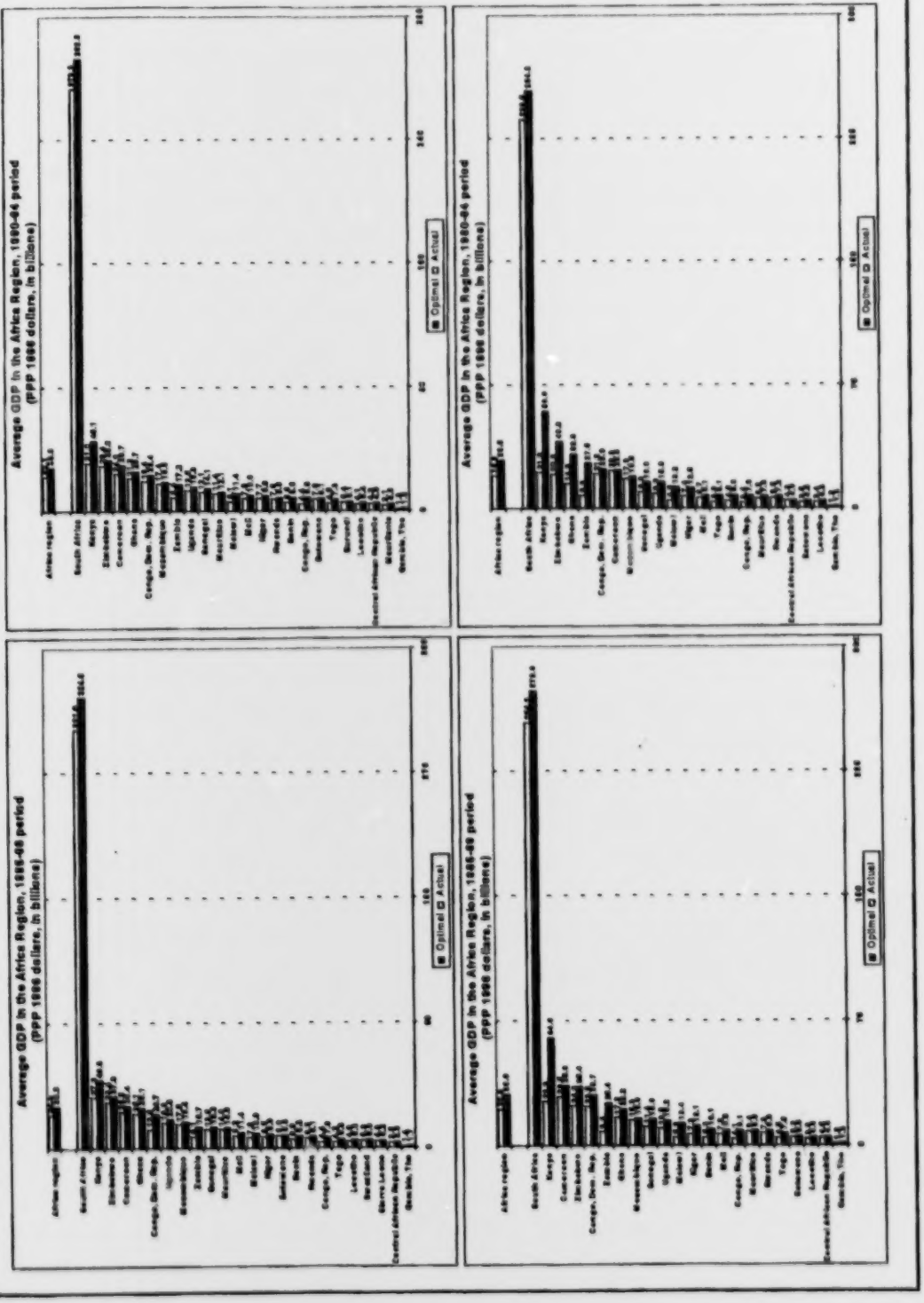
APPENDIX FIGURE A3-2: OPTIMAL AND ACTUAL AVERAGE GDP LEVELS IN THE AFRICA REGION



Source: Authors.

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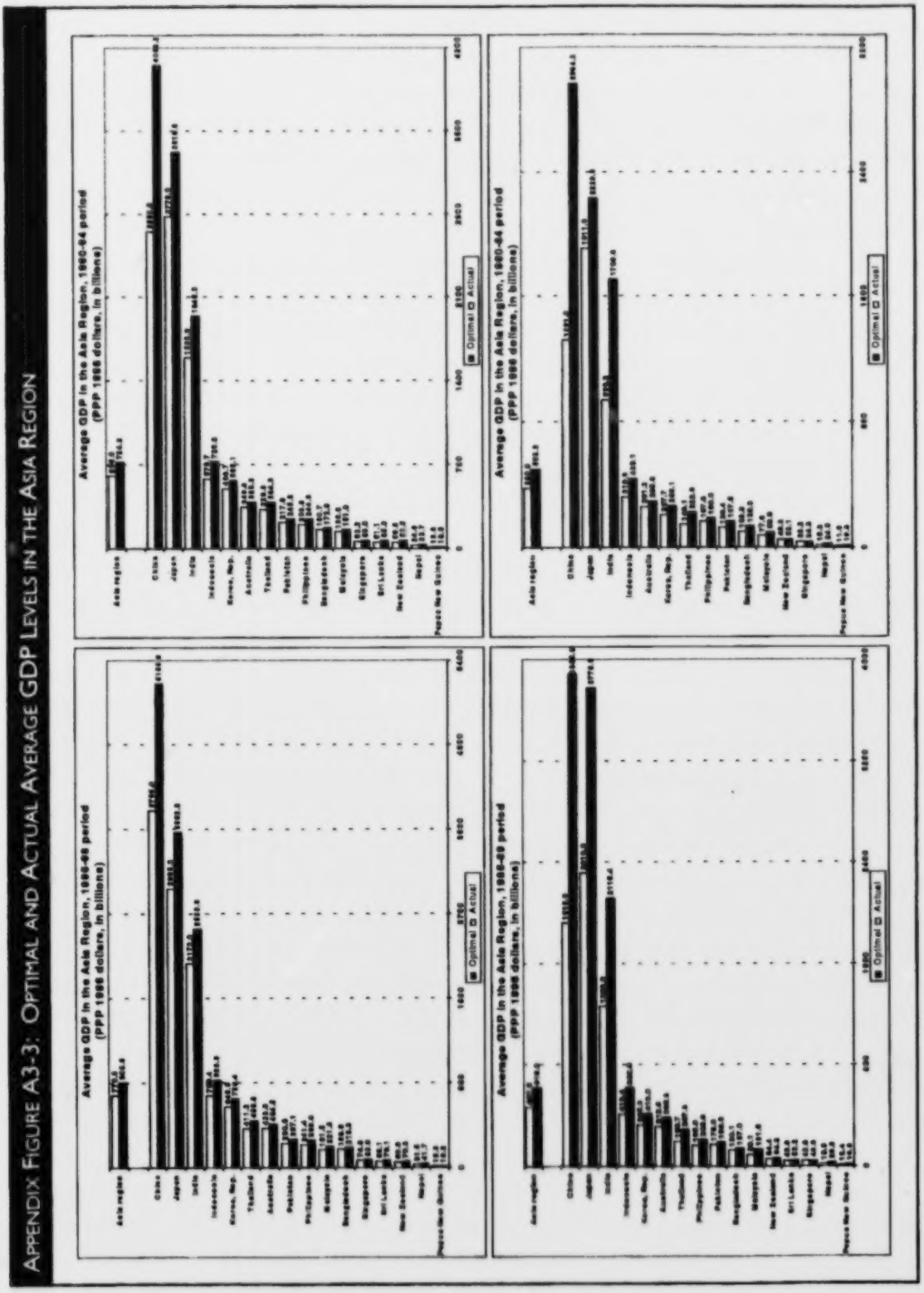
APPENDIX FIGURE A3-3: OPTIMAL AND ACTUAL AVERAGE GDP LEVELS IN THE ASIA REGION


Average GDP in the Asia Region, 1980-84 period
(PPP 1996 dollars, in billions)
Average GDP in the Asia Region, 1985-89 period
(PPP 1996 dollars, in billions)
Average GDP in the Asia Region, 1990-94 period
(PPP 1996 dollars, in billions)
Average GDP in the Asia Region, 1995-99 period
(PPP 1996 dollars, in billions)
Optimal
Actual

Source: Authors.

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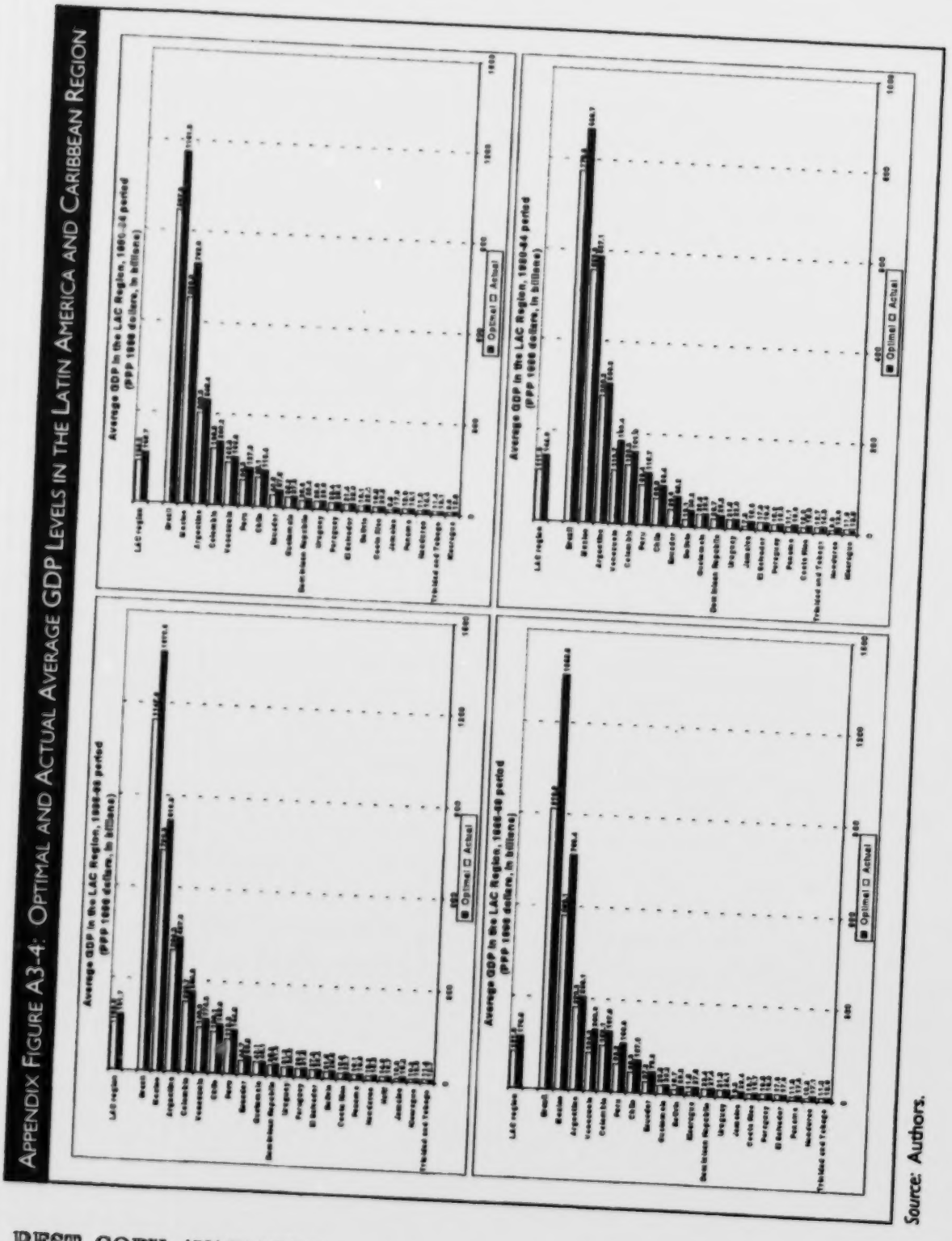
APPENDIX FIGURE A3-4: OPTIMAL AND ACTUAL AVERAGE GDP LEVELS IN THE LATIN AMERICA AND CARIBBEAN REGION


Average GDP in the LAC Region, 1950-54 period
(PPP 1996 dollars, in billions)
Average GDP in the LAC Region, 1960-64 period
(PPP 1996 dollars, in billions)
Average GDP in the LAC Region, 1980-84 period
(PPP 1996 dollars, in billions)
Average GDP in the LAC Region, 1988-98 period
(PPP 1996 dollars, in billions)
Optimal
Actual

Source: Authors.

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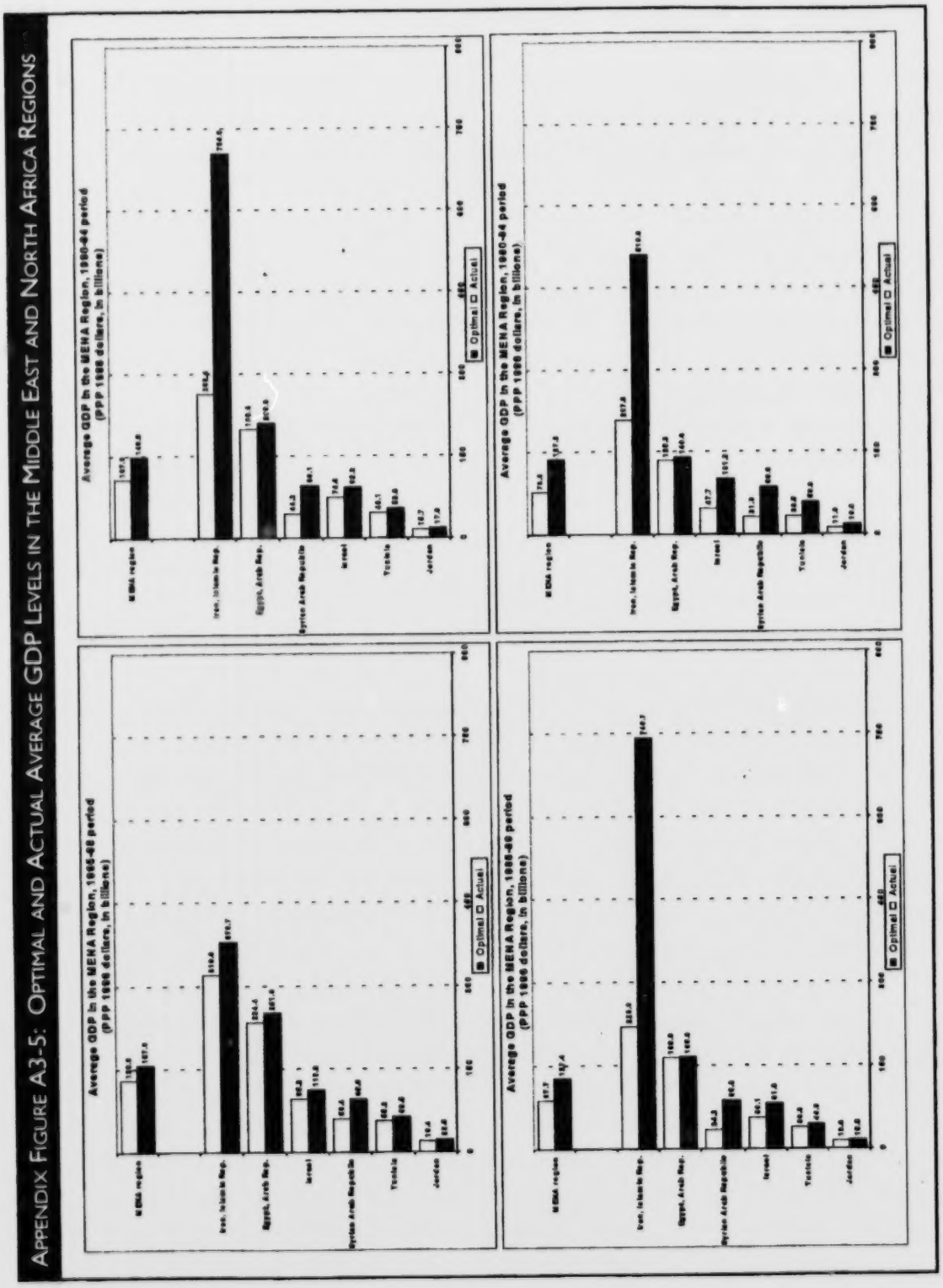
APPENDIX FIGURE A3-5: OPTIMAL AND ACTUAL AVERAGE GDP LEVELS IN THE MIDDLE EAST AND NORTH AFRICA REGIONS


Average GDP in the MENA Region, 1960-64 period
(PPP 1985 dollars, in billions)
Average GDP in the MENA Region, 1965-69 period
(PPP 1985 dollars, in billions)
Average GDP in the MENA Region, 1980-84 period
(PPP 1985 dollars, in billions)
Average GDP in the MENA Region, 1985-89 period
(PPP 1985 dollars, in billions)
Optimal
Actual
MENA region
Iran, Islamic Rep.
Egypt, Arab Rep.
Syrian Arab Republic
Israel
Tunisia
Jordan

Source: Authors.

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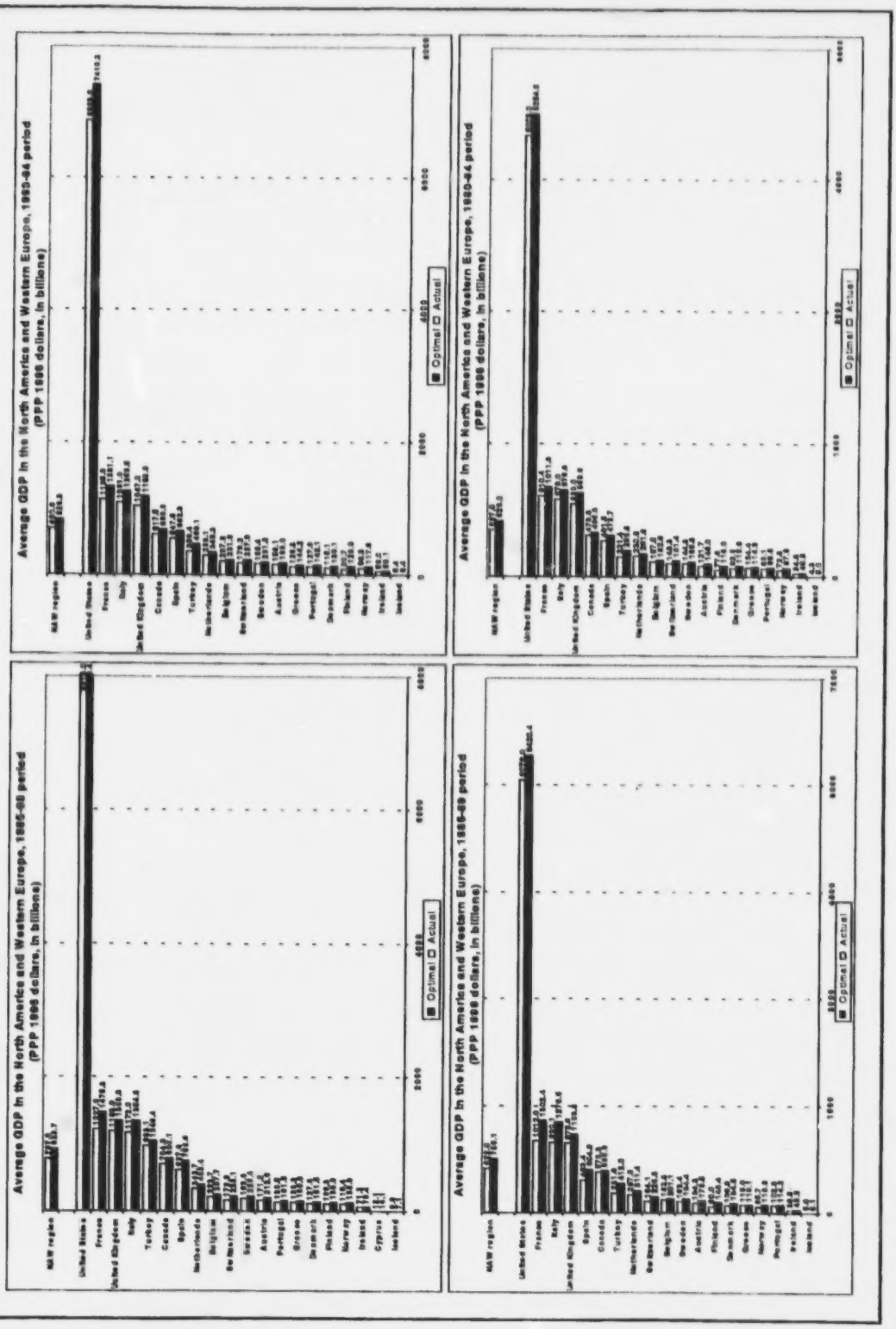
APPENDIX FIGURE A3-6: OPTIMAL AND ACTUAL AVERAGE GDP LEVELS IN THE NORTH AMERICA AND WESTERN EUROPE REGION


Average GDP in the North America and Western Europe, 1985-89 period
(PPP 1996 dollars, in billions)
Optimal
Actual
Average GDP in the North America and Western Europe, 1990-94 period
(PPP 1996 dollars, in billions)
Optimal
Actual
Average GDP in the North America and Western Europe, 1985-89 period
(PPP 1996 dollars, in billions)
Optimal
Actual
Average GDP in the North America and Western Europe, 1990-94 period
(PPP 1996 dollars, in billions)
Optimal
Actual

Source: Authors.

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CHAPTER 4

REACHING HEALTH AND EDUCATION TARGETS IN ARGENTINA: A PROVINCIAL-LEVEL ANALYSIS

Margaret Miller, Ruwan Jayasuriya, Elizabeth White, and Quentin Wodon[15]

Introduction

It is difficult to overstate the difficulties that Argentina is facing in 2002, simultaneously on economic, social and political fronts. It is the fourth straight year of economic contraction in the country, with activity expected to decline by more than 10 percent in 2002 alone. The convertibility plan, which set a fixed one-to-one peso/dollar exchange rate was abandoned in January 2002, dollar deposits in Argentine banks were converted to pesos and severe restrictions were placed on withdrawals. Since January, the exchange rate has climbed to more than 3 to 1, putting extreme pressure on prices. The national unemployment rate is in excess of 20% (e.g., 21.4% in May 2002).

Not surprisingly, poverty has increased dramatically in 2002, with a poverty rate in May 2002 of 53% and nearly 25% of the population classified as "indigent," defined as lacking the resources necessary to purchase food meeting minimum daily caloric requirements. The increase in poverty in the country has been accompanied by a sharp increase in inequality, with the wealthiest 10% of the population earning 30 or more times the income of the poorest 10%—a figure which had been only 12 times as recently as the mid 1970s. An unstable political situation has contributed to the country's economic problems, including the resignation of the elected President, Fernando de la Rua, in December 2001, high profile corruption cases involving government officials and uncertainty about the timing and outcome of the next presidential election, slated for 2003.

This chapter analyzes the relevance of the Millennium Development Goals (MDGs) in Argentina–a middle income country in crisis–as well as prospects for the attainment of the goals. As can be seen in Table 4-1, Argentina exhibits many indicators of an advanced developing economy including a high degree of urbanization, low birth rate, high life expectancy and until 2001, one of the highest per capita income levels in the developing world. The selection of Argentina—a relatively affluent developing country—was made in order to better understand how the MDGs, which sometimes are seen as appealing only to the poorest nations, are viewed by middle-income

15. We are grateful to Guillermo Cruces for providing the data used in the efficiency analysis.

TABLE 4-1: DEMOGRAPHIC AND ECONOMIC INDICATORS

	Latin America & Caribbean	Argentina
Population: Total, 2001 (in millions)	524	37
Population: Avg. annual growth % 1990–2001	1.6	1.3
Population: Urban (% of Total)	75.8	88.3
Life expectancy, 2000 (years)	70	74
PPP GNI pc ($) 2001	7,070	11,690
GDP pc: Avg. annual growth % 1990–2001	1.5	2.4
Exports % of GDP, 2001	17.6	10.8
Total debt service (% exports), 2000	38.6	71.3

Source: World Bank 2001.

countries. Another reason for the selection of Argentina was to understand the role for long-term goals, like the MDGs, when a country is undergoing a profound crisis.

In Argentina, the provinces have primary responsibility for delivering basic services in health and education. Since the decentralization of public services in the mid-1990s, the majority of expenditures on health and education are made at the provincial level and service delivery in these sectors is the responsibility of provincial governments. For these reasons, an analysis of the relevance of the MDGs in Argentina, and prospects for their attainment, must involve both the national and sub-national levels of government.

The province of Santa Fe was selected to provide a sub-national focus for this chapter, due to its size and importance in Argentina (8% of the population, 7% of GDP and 20% of exports) and the fact that it represents a type of "median case," since it is neither the richest nor the poorest of the provinces and has many indicators close to the national averages. In Santa Fe, education and health represented 45% of the provincial budget in 2000. Although Santa Fe has managed to contain public expenditures and limit accumulation of debt, other provinces have not been as capable of managing their expenses. Excessive borrowing by provinces has been a factor in the current crisis and a significant share of these funds has gone toward social sector spending.

This chapter focuses primarily on the health and education targets of the MDGs. Goals in these sectors comprise the majority of the Millennium Goals. These sectors also have a high priority in terms of social expenditures in Argentina and in Santa Fe. By focusing on these two sectors, we are also able to go into greater depth regarding the policy environment, progress over time and prospects for improvements.

Comparing National and Provincial Development Goals with the Millennium Development Goals

In spite of the rapid deterioration in living standards in Argentina and increases in poverty, there is no comprehensive national poverty reduction plan. Santa Fe also lacks a comprehensive poverty reduction strategy but, as mentioned above, there is clearly a commitment to social objectives since the health and education budgets together account for approximately one-half of the provincial budget. There are, however, sector strategies for education and health which relate to some of the MDG targets, both at the national and provincial levels. Table 4-2 presents Argentine goals, both at the federal level and in Santa Fe, corresponding to the MDGs.

Goals for Education

In education, the quantitative goals which are listed in Table 4-2 are taken from the Federal Education Pact, a law passed in 1997 which codified earlier agreements between the provinces and federal government related to education reform. These ambitious national goals were set for the period 1995 to 1999 but largely went unmet and reflect priorities still relevant today, including 100% uni-

TABLE 4-2: COMPARISON OF SELECTED MILLENNIUM DEVELOPMENT GOALS (MDGS) AND ARGENTINA & SANTA FE DEVELOPMENT GOALS (ADGS)

Millennium Development Goals (MDGs)	Argentina & Santa Fe Development Goals	ADG more(+)/less (–) ambitious than MDG
Eradicating Poverty and Hunger	**Reduce the percentage of poor and hungry households**	
Halving 1990 $1 a day poverty and hunger rates	*Target 1:* There does not seem to be a specific goal for reducing poverty by a certain date in Argentina	NC
	Target 2: There does not seem to be a specific goal for reducing hunger by a certain date in Argentina	NC
Universalizing Primary Education	**Universalize education and improve education quality** (goals from the Federal Education Pact, Law 24.856, September 1, 1997)	
Ensure all children complete primary school	*Target 1:* Extend public education to all five year olds (100% enrolment)	+
	Target 2: Attain 100% enrolment for all 6 to 14 year olds	+
	Target 3: Attain 70% enrolment for all 15 to 17 year olds	+
	Target 4: Reduce repetition rates by 50%	NC
	Target 5: Reduce illiteracy by 50%	+
	Target 6: Incorporate 100% of schools in the new education structure	NC
Promoting Gender Equality	**Ensure gender equality and women empowerment**	
Equalizing the ratio of girls to boys in education	*Ratio of girls/boys enrolled in school*	A
	Equal numbers of girls and boys are enrolled in primary and secondary education—girls even have a slight lead over boys.	
	Ratio of literate females/males	A
	Literacy rates are on par between the sexes.	

(Continued)

TABLE 4-2: COMPARISON OF SELECTED MILLENNIUM DEVELOPMENT GOALS (MDGS) AND ARGENTINA & SANTA FE DEVELOPMENT GOALS (ADGS) (*CONTINUED*)

Millennium Development Goals (MDGs)	Argentina & Santa Fe Development Goals	ADG more(+)/less (–) ambitious than MDG
Reduce Child Mortality	**Reduce child mortality, child malnutrition and reduce the birth rate** (for Santa Fe)	
Reduce the 1990 under-5 mortality rate by two thirds by 2015	*Target 1:* Reduce the infant mortality rate from 13.7 per 1000 live births in 2000 to 12 per 1000 live births by 2002 (down from 23.5 per 1000 in 1990)	+
	Target 2: Reduce the neonatal (<28 days) mortality rate from 9 per 1000 live births in 2000 to 8 per 1000 in 2002	NC
	Target 3: Reduce the mortality rate for children between one and four years of age to 35 per 100,000 inhabitants by 2000 (down from 61 in 1993)	+
	Target 4: Increase and maintain mandatory vaccination coverage of children above 90% (measles coverage at 99% in 1999)	+
Improve Maternal Health	**Improve maternal health** (for Santa Fe)	
Reduce the 1990 maternal mortality by three quarters	*Target 1:* Reduce the maternal mortality rate to 20 per 100,000 live births by 2002 (down from 28 in 1998 and 43.3 in 1990)	+
	Target 2: Increase the percentage of pregnant women with at least 5 prenatal medical visits to 70% of all pregnancies by 2002 (up from 54.7% in 2000)	NC
	Target 3: Increase the percentage of pregnancies with first prenatal visit before the 20th week to 60% of total by 2002 (up from 48.3% in 2000 and 34.8% in 1995)	NC
	(More than 98% of births in Santa Fe occur in hospitals, health centers and other institutions.)	A

Source: Authors Note: In column 3, "NC" means Not Comparable, and "A" means achieved.

versal primary enrolment beginning at age five, increasing enrolments in secondary schools, reducing repetition rates and improving literacy.

Another goal of the Federal Education Pact was to incorporate 100% of all Argentine schools in the national education reform program which lengthened mandatory education from six to nine years, followed by more specialized high school curricula for the final three years of secondary school. This goal has proven to be a significant challenge at the provincial level since it requires investments in new curricula, retraining of teachers, reconfiguring of physical space and interventions to encourage students to complete a longer cycle of education.

In Santa Fe, the main objective of the Ministry of Education since the late 1990s has been the implementation of the national education reform program. No specific targets or indicators have been established, however, to measure the province's progress toward this goal. For this reason, no quantitative indicators for education are included in Table 4-2 for Santa Fe.

How do national and provincial priorities in education compare to the MDGs? Argentina participated in the United Nations Education Summit in Jomtien, China but did not develop an action plan or strategy based on the Summit, as occurred in the health sector, to be discussed shortly. Still, both national and provincial strategies have recognized the importance of achieving universal primary education, which is a fundamental aspect of the Jomtien platform which went on to inform the MDGs. Increasing equity in the education system, as well as strengthening the contribution of education to reducing inequalities in Argentine society, represent another set of priority issues which are relevant to the goals expressed in the MDGs. Salaries of more educated workers have increased much more rapidly in recent years in Argentina than those of unskilled workers, so human capital formation through education remains a key way of moving people out of poverty. The education reform, for example, was intended to strengthen education quality and better prepare students for full participation in Argentine economic and social life. It is still unclear the extent to which the reform will attain these objectives.

In other important ways, however, Argentine goals for the education sector diverge from the Millennium Goals, in particular with regard to greater attention to secondary schooling. Some of the differences between Argentine goals and the MDGs in education—as well as those related to gender equity in education—can be explained by Argentina's relatively strong performance. The youth literacy rate is over 90% in nearly every province and is 96% nationally. Equal numbers of girls and boys are enrolled in primary and secondary education (girls even have a slight lead over boys) and literacy rates are also on a par between the sexes. Argentina has also achieved the goal of nearly universal enrolment in primary education, as virtually all children in the country enter primary school when six or seven years of age.

The weakness in the primary education system, which does not appear to have received the attention it deserves, is the relatively low rate of completion of primary school–often a counterpart of high repetition rates leading to drop-outs. In some of the nation's poorer provinces, such as Misiones, only about two-thirds of students are finishing primary school (completing the 7th grade) within ten years of entering the system, in other words, allowing for pupils who repeat as many as three years. While completion rates in Santa Fe exceed the national averages at all grade levels, there is still concern with excessive repetition rates, which are higher than national averages for the early grades (1–6) and which may be particularly elevated in specific school districts within the province. Further, school abandonment in Santa Fe reaches almost 30% by the final three years of secondary education (the period referred to as the polimodal).

Goals for Health

There is much greater overlap between health goals in Argentina and the MDGs, which both focus on primary care, mother-child health and control of infectious diseases. The complementarities between the Millennium Development Goals and Argentina's national goals in the health sector are not a simple coincidence. Argentina actively participated in the United Nations Conferences which developed the goals that were eventually included in the Millennium Declaration. For example,

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subsequent to the nation's participation in the 1990 Children's Summit in New York, Argentina drafted a national action plan to achieve the children's and maternal health goals resulting from that meeting. The "National Commitment to Mothers and Children," which was published in 1991, presented national goals in line with those developed at the UN Summit, as well as means for achieving them. This national goal-setting exercise was not integrated into management of health resources and budget in the 1990s, however, in part because of a move to decentralize health services to the provinces.

More recent national strategic plans for the health sector identify priority issues but not quantitative targets. For example, the Ministry of Health issued a new strategic plan in 2000 which focused on changing the way care is provided, by shifting resources toward primary care and preventive medicine. Specific indicators were to be developed by the Federal Committee for Health (COFESA–Consejo Federal de Salud), that includes the Ministers of Health for all the provinces, and at the provincial level, but due to the crisis and subsequent change of government this strategy was never fully implemented.

The Ministry of Health in Santa Fe has focused their strategic planning on maternal and child health since at least 1995. In that year the Ministry published a five year plan, "Provincial Goals for Maternal and Child Health 1995–2000," designed to improve basic health indicators. The five year plan was explicitly described as the province's action plan for meeting goals for improving maternal and child health which were developed in the 1990 UN Children's Summit and then included in the 1991 Argentine plan discussed previously. It established specific targets for reducing infant mortality, child mortality, maternal mortality and for making other improvements such as reductions in malnutrition and numbers of low birth-weight babies and increasing vaccination rates in Santa Fe (Provincia de Santa Fe, 1995).

In 2001 a new strategic plan for maternal and child health was presented by the Ministry of Health—key indicators from this strategy are presented in Table 4-2. "The Health of Mothers, Girls and Boys: Betting on Life" established a framework for improving basic health indicators and set specific quantitative targets for progress between 2001 and 2002, many in common with the 1995–2000 plan. In most cases, the 2002 goals are less ambitious than those set in 1995 for 2000, with the notable exception of infant mortality, for which a target of 12 deaths per 1,000 live births is set, down from the 2000 target of 13.3. The increase in coverage of required vaccinations in 2002 is below the 2000 target—at 90%—and appears to be within reach, since most of the different vaccines already have coverage rates above 90%. The most ambitious of the 2002 goals seems to be the reduction of maternal mortality from 28 to 20 per 100,000 in just one to two years. Only limited progress has been made toward this goal in the last five years and the rationale for expecting such a rapid improvement is not clear. In addition to Santa Fe's strategies for maternal and child health, the province also has developed plans for controlling infectious diseases, such as AIDS and tuberculosis.

Why do the health goals set in the MDGs resonate as well as they do with national and provincial priorities in health? After all, Argentina has achieved infant mortality rates which are beginning to approach developed country levels and has relatively low levels of infection from HIV/AIDS and tuberculosis. One reason has to do with the mission of public health authorities to assist the most vulnerable members of society, which include expectant mothers and children, as well as to control the spread of infectious disease. Investments in infant and child health, in particular, are popular initiatives which easily garner public support. Another reason is that pre-natal care, attended births and prevention of infection from HIV or TB are ways to avoid more costly emergency care or treatment of chronic illness and thus are good investments. Maternal and child mortality is also an area where equity concerns are great, since IMR, U5MR and MMR vary significantly across Argentine society, by province and within provinces by regions and income levels. Finally, health sector specialists are accustomed to working with indicators to manage disease and monitor mortality and especially the indicators for infant, child and maternal mortality are part of a core set of indicators frequently followed by public health authorities internationally. The indicators for AIDS and tuberculosis are also relevant in Argentina, however, since these diseases affect a

relatively small share of the population they have less visibility than other goals, such as those for mothers and children, and also have a lower priority than they would in countries with very high infection rates.

With respect to the environment, Argentina has made little progress in establishing quantitative targets. One exception, however, is the case of voluntary greenhouse gas targets, where Argentina is a world leader. Argentine policy makers are also concerned about increasing access to clean water, which is one of the main MDGs, however, no specific national targets have been established for this goal.

Progress Toward the Goals

Measuring progress toward the Millennium Goals or toward specific national or provincial goals is complicated by the current crisis. For example, reductions in poverty attained during the 1990s have been drastically reversed in the last one to two years and hunger and malnutrition have increased. These changes will affect Argentina's ability to meet the Millennium Goals but it is difficult, if not impossible, to accurately predict the long-term consequences of the present crisis on poverty reduction, much less on other indicators. For example, the effect of the crisis on indicators such as infant mortality and school enrolments has yet to be determined, because of the lag-time between falls in income and changes in these indicators, uncertainty about the relationship between macroeconomic performance, public expenditures and outcomes in health and education and the time it takes to reliably collect and disseminate this data.

In this section, Argentina's progress toward the MDGs is reviewed, both at the national and provincial levels. The most recent available data is presented, but often these figures predate the current crisis. Even so, the data provide insights as to Argentina's progress in the social sector since 1990 and the country's ability to meet future goals. When there is information indicating the direction of changes over the past year, comments are included.

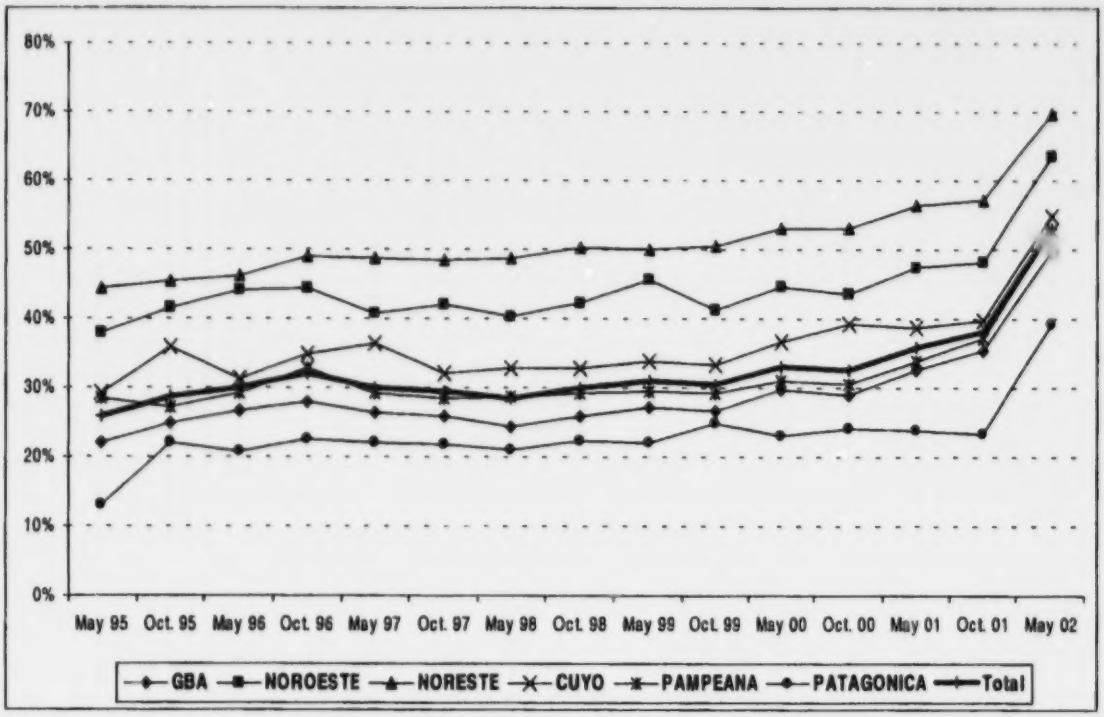
Consider first poverty. The increase in poverty in Argentina over the past year has been well-documented. The national statistical agency, INDEC, regularly releases poverty rates; as of mid-2002 the national (urban) poverty rate was 53%, up from 36% one year earlier. Figure 4-1 shows the evolution of poverty rates in Argentina since 1990 through 2002. As can be seen, Argentina suffered from the Tequila crisis after Mexico's devaluation in 1995 and 1996, but recovered in 1997 and 1998. Since then, however, poverty has been steadily rising, with a large increase in the first half of 2002 due to the collapse of the economy. Santa Fe has followed the national trends in poverty. In Figure 4-1, we reproduce trends in the share of the population in poverty according to six regions estimated by Cruces et al. (2002). In the figure, Santa Fe is part of Pampeana, a region that is neither very poor, nor very rich, but which has witnessed an increase in poverty since 1999 and especially over the first half of 2002 similar to other regions

In education, Argentina maintained a high rate of primary enrolment and increased secondary enrolments since the mid-1990s. As Figure 4-2 shows, primary enrolments were basically constant at around 96 to 97% between 1995 and 2001. (The dip in enrolments in 1999 is probably a data anomaly.) Santa Fe performed slightly better than the national average in net primary enrolments, ending 2001 with a rate of 97%.

In terms of net secondary enrolments, there were significant improvements in the 1990s at both the national and provincial level, as can be seen in Figure 4-3. Nationally, net secondary enrolment rates improved from about 70% in 1995 to more than 75% by 2001. In Santa Fe even faster progress was achieved, with an increase of more than ten percentage points in the period to reach 78% by 2001.

Santa Fe, and Argentina more generally, have virtually attained the MDG of universal primary enrolment. With rates in the high 90s, almost all children in the country begin school between six and seven years of age. The more pressing problem is increasing completion rates for primary school–another MDG indicator. High repetition rates which then contribute to school abandonment before completion of the full primary cycle continue to be a problem in Santa Fe and other provinces.

FIGURE 4-1: PROPORTION OF POOR INDIVIDUALS IN REGIONS, URBAN ARGENTINA, 1995–2002

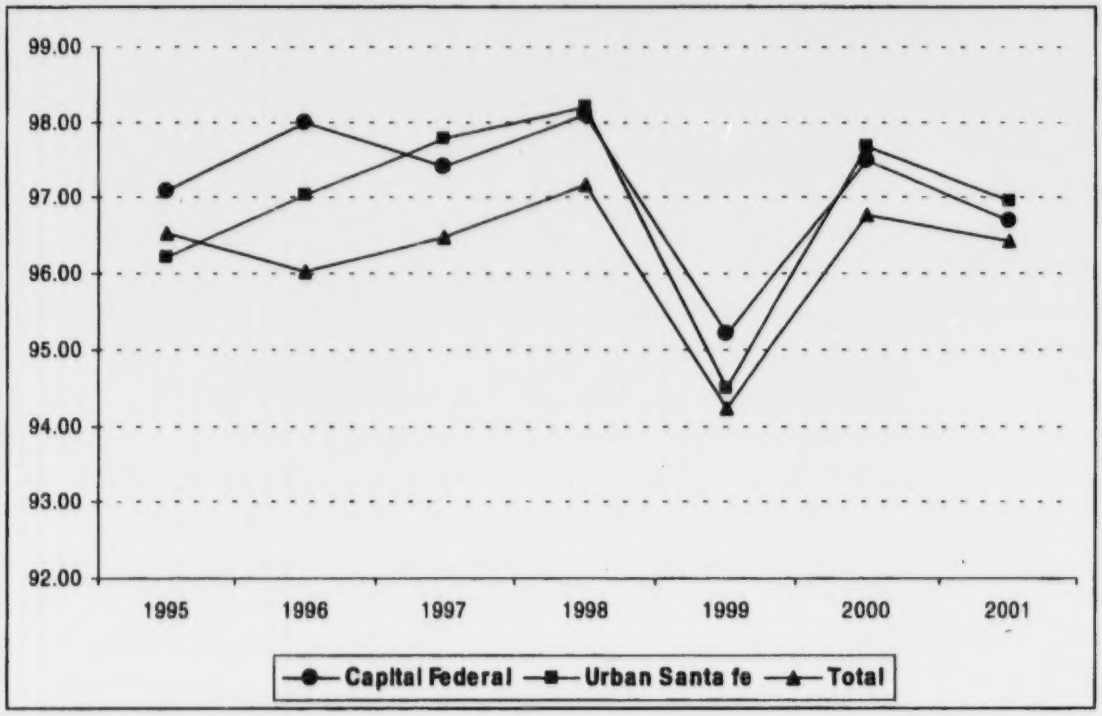


Source: Authors.

In the crisis atmosphere of early 2002, efforts are being made to maintain services—and keep up enrolments—in the face of declining budgets, in real and sometimes even nominal terms. In the province of Buenos Aires, for example, the budget for education was trimmed by 500 million pesos for 2002 (in comparison to 2001) prompting protests from the teachers' union and a rethinking of the agreement between the province and union. There are already alarming anecdotal information indicating children are dropping out of school due to economic necessity, and thus another immediate concern of the national authorities is to maintain previous achievements of relatively high enrolment rates and literacy rates in the face of economic turmoil as well as contribute more effectively to poverty reduction and greater equality of opportunity.

In health indicators, since 1990 Argentina has made significant progress in reducing both infant and child mortality rates. Infant mortality fell from 25.6 to 16.6 deaths per 1,000 live births between 1990 and 2000 and under-five mortality fell from 28 to 22 deaths per 1,000 during the same period. While these represent important reductions, they do not put Argentina in line to meet the Millennium Goals of a two-thirds reduction by 2015. In the case of infant mortality, at the current rate of reduction of approximately 3.45% per year, Argentina will achieve a reduction of just under 60% by 2015, or 10.4 deaths per 1,000 live births, short of the MDG target of 8.4 deaths. By way of comparison, countries with IMR statistics close to 8.4 in 2000 include South Korea, Hungary and Croatia. With under-five progress rates of approximately 2.6% per year, Argentina will fall further short of the MDG target, achieving a halving of child mortality by 2015 rather than a reduction of two-thirds (for a summary of a model-based analysis of the likelihood of Argentina and other Latin American countries of reaching the MDGs, see Hicks and Wodon, 2002.)

FIGURE 4-2: NET PRIMARY ENROLMENT, 1995–2001

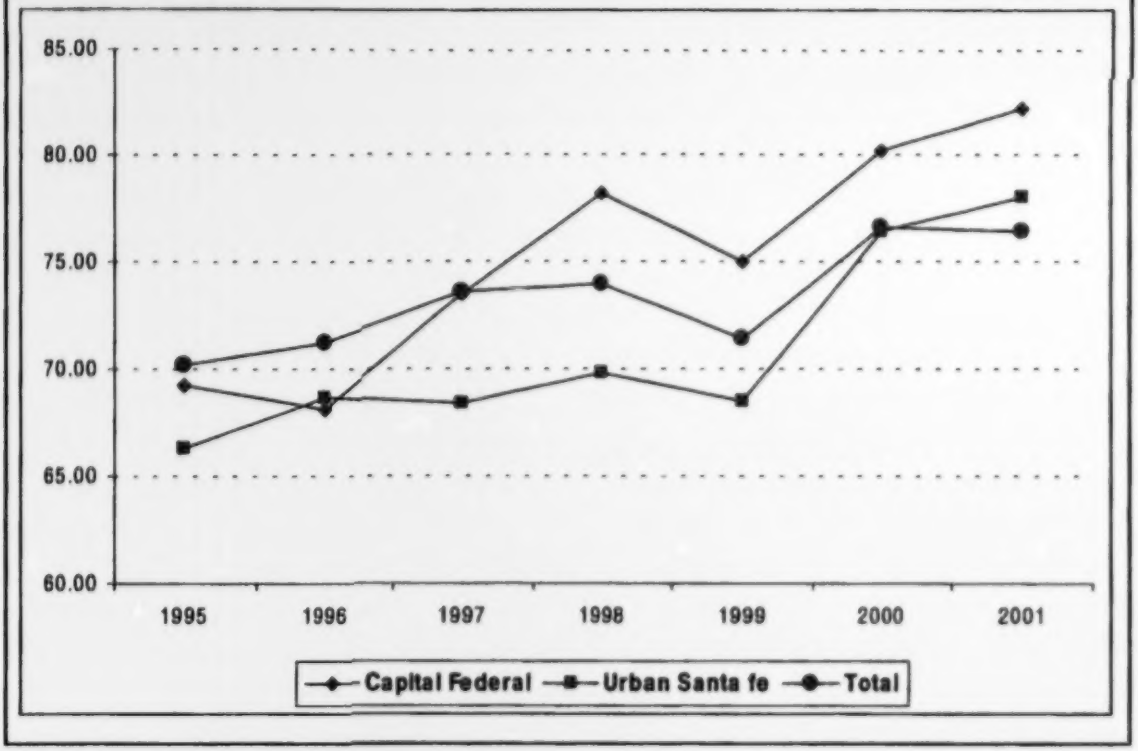


Source: Authors.

As would be expected, the distribution of infant deaths is not even throughout the country, with poorer communities and provinces experiencing rates as much as three times as high as the city of Buenos Aires, which has the lowest rate at 9.4 per 1,000 live births. Corrientes posted the highest rate in 2000, at 30.4, followed by Jujuy, Formosa, Tucumán, Misiones, Chaco, Catamarca and La Rioja, all with rates in excess of 20 per 1,000. Infant mortality rates for the provinces are highly correlated with regional poverty; the correlation statistic for infant mortality with the percent of population under the poverty line is 0.76. However, there are noticeable exceptions to this rule. For example, Santiago del Estero is one of the poorest provinces, with 48% of the population under the poverty line in 2001 and provincial GDP less than half the national average. Despite the province's poor economic performance, infant mortality rates are among the lowest in the country at 13.2, following only the City of Buenos Aires, Tierra del Fuego and Neuquén. On the other hand, Santa Cruz, which has one of the lowest poverty rates and GDP more than 70% over the national average, has an infant mortality rate above the national average at 17.2 per 1,000—a level similar to poorer provinces including San Luis (17.2 per 1,000) and Entre Rios (16.9 per 1,000).

Progress on maternal mortality in Argentina has been less impressive during the 1990s. Given the country's income level and other health indicators, maternal mortality rates remain relatively high at 38 per 100,000 live births in 1999. Argentina is likely to fall far short of the Millennium Goal of reducing maternal mortality by three-quarters, to about 10 deaths per 100,000 live births, by 2015. The high maternal mortality rate is particularly disturbing given the high rate of attended births, which exceeded 97% in 1995. The national health strategy sets several goals in relation to this problem including all expectant mothers having five pre-natal visits and having the first of these no later than 20 weeks into the pregnancy. However, one factor which is not discussed in the

FIGURE 4-3: NET SECONDARY ENROLMENT, 1995–2001



Source: Authors.

strategy is deaths related to illegal abortions. This procedure is not legal in Argentina and therefore not offered through the public health system. Although reasonably safe illegal abortions are usually obtainable for those who can afford to pay, they are beyond the reach of the poor. Because of the controversy surrounding this procedure in a country where more than 90% of the population are Catholic, this problem is unlikely to be addressed soon.

As with infant mortality, maternal mortality rates vary greatly by province, with Formosa registering by far the worst rates—more than 150 per 100,000—in both 1999 and 2000. The lowest rates in 1999 and 2000 were found in the city and province of Buenos Aires and in Córdoba, which all registered rates below 20 per 100,000 in both 1999 and 2000. Presumably, this is in part due to the prevalence of high quality hospital care in these areas. Although Santa Fe also boasts urban centers with good hospitals, the rate for the province was close to the national averages of 41 in 1999 and 35 in 2000. It is also worth noting that the variance in maternal mortality rates was greater during this period than the variance in infant mortality. It is also useful to note that the correlation between income and maternal mortality is much weaker than in the case of infant mortality. Since maternal deaths are relatively infrequent, they provide indications of the capacity of health systems to address acute problems, including internal bleeding, as much as an indication of overall wellness of the population.

In terms of AIDS, tuberculosis and other contagious diseases such as leprosy, malaria and chagas, Argentina had mixed success during the 1990s. While the country has thus far contained the spread of AIDS, estimated in 1999 to have infected less than one percent of the population (0.9%), the situation is precarious. The federal government does not have a coordinated AIDS strategy and the main AIDS prevention and treatment program, which has been funded through a World Bank

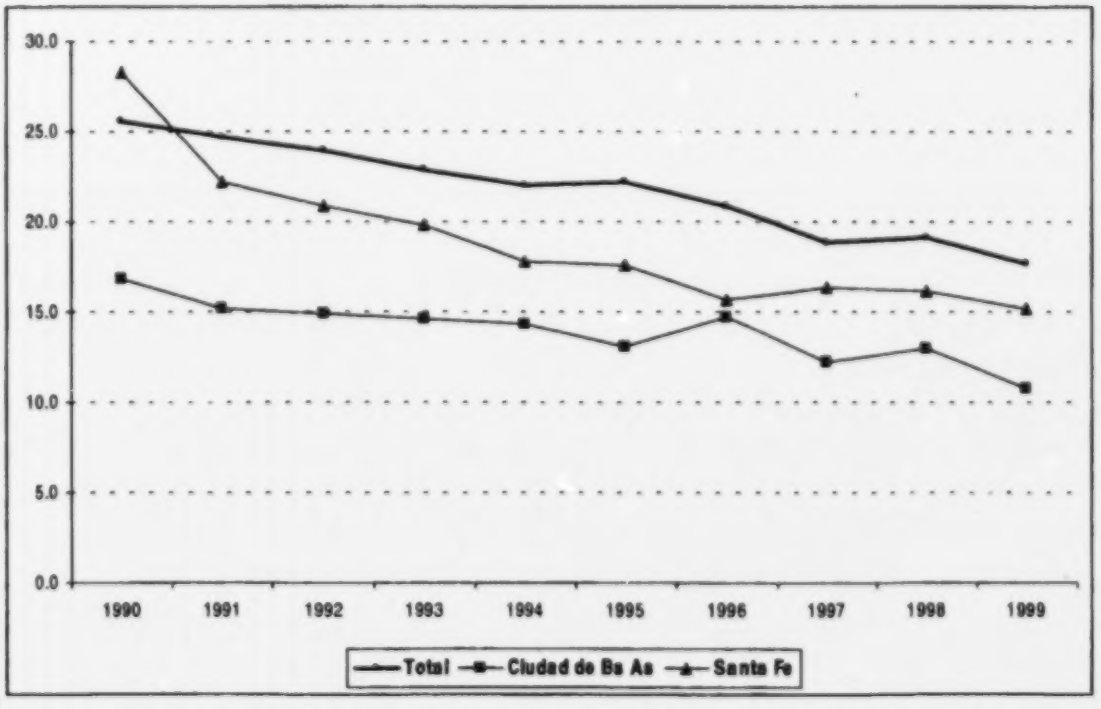
loan about to close, does not have future funding secured. The current crisis and devaluation have also greatly increased the cost of AIDS related drugs, including the staple anti-retrovirals, which are all imported, leading to reported shortages for current patients and doubts about the Government's ability to attend to new patients.

In Santa Fe, the goals set in 1995 were ambitious, having been established at a time when the economic situation in Argentina was improving and poverty was falling. In maternal mortality, the goal was to move from 25 deaths per year in 1990 (43.3 per 100,000) to 11 by 2000 (20.1 per 100,000). Infant mortality, which was approximately 1500 in 1990 (23.5 per 1,000) was to be reduced to 734 by 2000, a rate of 13.3 per 1,000. Mortality in children under five years of age was to be reduced from a rate of 61 per 100,000 (135 cases) in 1993 to 35 per 100,000 by 2000 (77 cases).

Figures 4-4 and 4-5 compare the reductions in infant and child mortality, respectively, at the national level with reductions in Santa Fe and the City of Buenos Aires between 1990 and 1999. As is evident, Santa Fe registered the steepest reductions in IMR and U5MR in this period, especially through 1995.

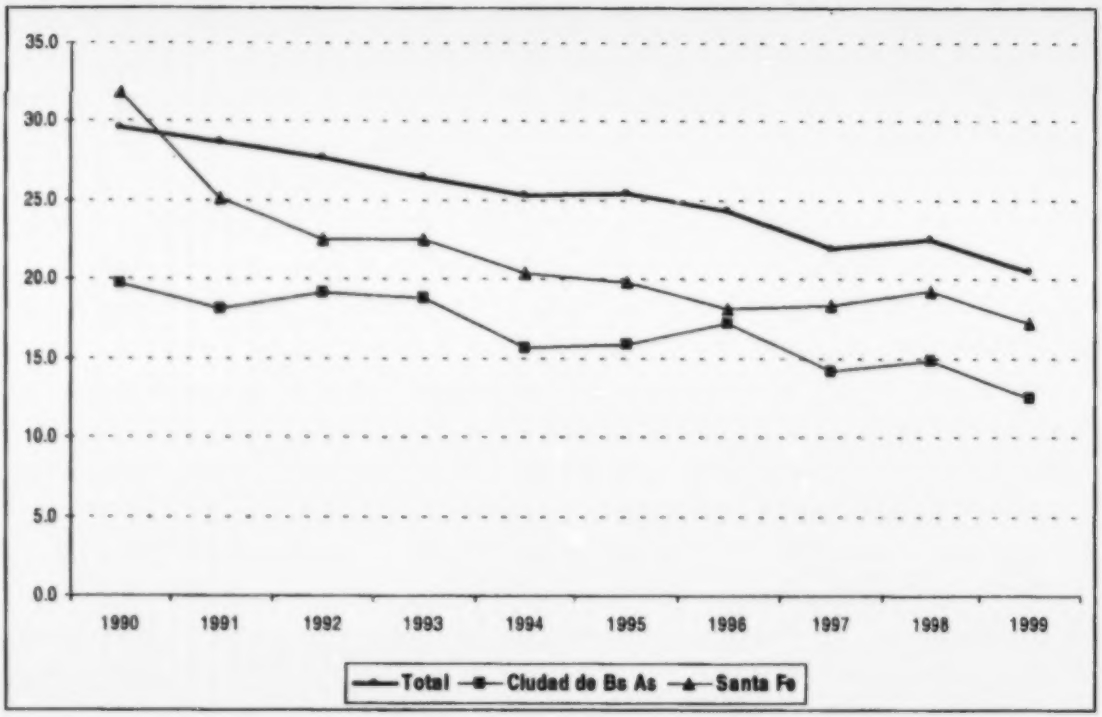
At current rates of progress, Santa Fe is on track to meeting the Millennium Goal of reducing infant mortality by 2/3 between 1990 and 2015. In fact, if they can sustain a rate of decline in IMR exceeding 5% per year, as was the case in the 1990s, Santa Fe will exceed the MDG, posting a reduction of more than 70% to 6.52 rather than 8 per 1,000 live births. In terms of maternal mortality, progress between 1990 and 2000 was good, falling by more than 4% per year, which would put the progress on track for a reduction of about ⅔ between 1990 and 2015, short of the ¾ goal set in the MDGs. The main concern with MMR is that this statistic has not changed much since

FIGURE 4-4: INFANT MORTALITY RATE (PER 1000 BIRTHS), 1990–1999



Source: Authors.

FIGURE 4-5: CHILD MORTALITY RATE (PER 1000 BIRTHS), 1990–1999



Source: Authors.

1995, so the province may be facing a situation where further reductions in maternal mortality will require different types of interventions or programs than those currently available.

Obstacles and Opportunities for Accelerating Progress Toward the Goals

The Crisis in Argentina

The most important and most obvious challenge facing Argentina in making progress toward the MDGs and other national goals is the current crisis. Poverty rates have soared to above 50% nationwide and the unemployment rate is close to 25%; many Argentines cannot afford necessities including food and basic medical care. In this kind of acute situation the focus is on surviving in the short-term, not working toward long-term goals, so it is natural to question the relevance of the MDGs. In terms of the goals themselves—reduction of poverty and hunger, strengthening primary education and gender equity, improving child and maternal health, controlling infectious disease and protecting the environment—the crisis has actually increased the relevance of many of them in this middle-income country. However, the crisis has also made some of the quantitative targets associated with the goals seem overly ambitious—especially when the targets would suggest Argentina attaining a level of performance approaching developed country norms by 2015.

It is clear that the crisis is retarding progress toward the MDGs, beginning with the goals for poverty and hunger which have increasing rather than decreasing rates of prevalence. The impact on other goals in health, education and the environment is less evident and will depend on the duration of the crisis and the speed of recovery as well as the ability of the government and society to provide a safety net during this time. In this context, it is useful to remember that many of the goals for education and health which were developed prior to the crisis by the national and provin-

cial governments in Argentina were more ambitious than the MDGs in terms of the rates of progress they envisaged. Given the severity of the present crisis and the social strain it is causing, a reasonable approach might be to identify short to medium-term goals (for the next 1–5 years) and wait a year or two when recovery has begun to evaluate whether there is a need to revise long-term national and provincial goals, including targets for the MDGs.

Even the current crisis, however, may offer opportunities for strengthening Argentina's long-term ability to meet ambitious social goals, including the MDGs. One of these opportunities involves a more efficient and cost-effective public sector in health and education. Salaries of public workers have been cut in real terms by one-third or more as prices of many goods increase while nominal salaries stay fixed. These adjustments reduce the cost of providing services and may help to facilitate needed cuts in the public sector workforce. For example, per capita expenditures on health care have fallen from US $612 in 2001 to an estimated US $183 in 2002, according to the national Ministry of Health—an amount more in-line with the country's ability to pay. In the province of Buenos Aires, the 2002 education budget was cut by 500 million pesos in comparison with 2001, prompting protests but also a rethinking of the agreement between the provincial government and teachers' union.

The crisis also creates strong incentives for policy makers to focus on the most cost-effective means of providing services as budgets are cut in real—and even in nominal—terms. In the health sector these cuts have been particularly acute as a higher percentage of inputs, namely medicines and other medical equipment and inputs, are imported and priced in dollars. As a result, the crisis has led to greater attention on primary care and preventive medicine as cost effective means of maintaining a healthier population. Efforts to consolidate employer-based health insurance schemes are also designed to improve the long-term efficiency and viability of the system.

Another positive change resulting from the crisis may be increased demands for accountability in the public sector from Argentine citizens. Work on improving the quality of public services often includes the importance of involving citizens in the decision-making process. Thousands of people have taken to the streets to protest unpopular policies since 2001. What remains to be seen is whether this energy will be channeled into greater civic participation in the years to come.

Efficiency in Reaching Education and Health Targets

As discussed previously, outcomes in education and health vary significantly between provinces. Many factors could be behind these differences but some of the most commonly cited are income levels and public spending on health and education. Another factor which could have an impact on social indicators is the efficiency of public expenditures (or effectiveness of interventions).

This section analyzes the extent to which inputs such as income levels, public spending and other common factors such as access to potable water (for health) and literacy levels (for education) contribute to outcomes in education and health. The analysis is then extended to understand how efficiently provinces use these inputs in achieving their outcomes. Data for Santa Fe is highlighted and compared with an average for all Argentine provinces. The methodology used in this exercise is briefly described Box 4-1.

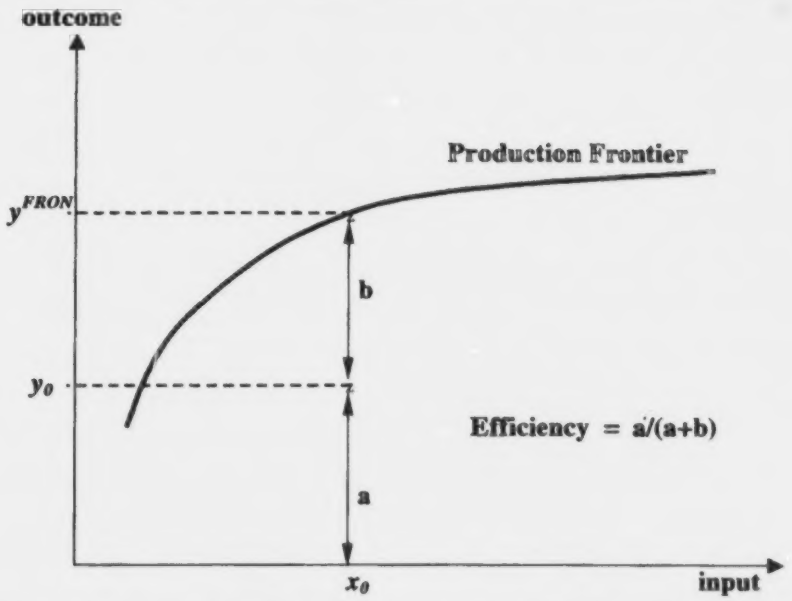
Efficiency in Reaching Education Targets

For this exercise six education outcomes are considered: net primary enrolment, net secondary enrolment and language and mathematics test scores for both primary and secondary schooling. The net enrolment rates are used as proxies for education flow variables, while test scores are used as education quality measures. Table 4-3 shows initial, final and average values for these outcomes between 1995 and 1999; there are a total of 120 observations. Santa Fe fares better than the provincial averages for net primary enrolment rate over the period (96.8 versus 96.1), but below par for the net secondary enrolment rate (66.4 versus 72.1). It does better than the provincial average for all education quality measures for both language and math in primary and secondary school. Input use in Santa Fe to reach these outcomes was above the provincial average for per capita GDP

BOX 4-1: THE METHODOLOGICAL APPROACH USED TO ESTIMATE THE EFFICIENCY OF INPUT USE

Consider the one-input one-output example in Figure 4-6. The objective or outcome is depicted along the vertical axis while input use to reach this outcome is depicted on the horizontal axis. The curved line (i.e., the production frontier) represents the maximum possible level of the outcome that can be obtained for a given level of input use. The efficiency (E) of public spending can be defined as the ratio of attained or observed outcome to the best practice outcome for a given level of input use. Assume that a country produces "a" units of outcome from x_0 units of inputs, and that under perfect efficiency it could have produced "a+b" units of the outcome. Efficiency E would then be "a/(a+b)." While the outcome could be improved through an expansion of input use, keeping efficiency constant, it can also be improved through an increase in efficiency, keeping input use constant, or a combination of both.

FIGURE 4-6: MEASURING EFFICIENCY OF INPUT USE



Source: Jayasuriya and Wodon (2003).

In order to measure the efficiency of various provinces in improving health and education indicators, Jayasuriya and Wodon (2003) estimate production frontiers using a stochastic frontier approach, so that the efficiency measures are obtained relative to these estimated frontiers. Per capita GDP, per capita expenditures on the respective social sectors (primary education, secondary education, or health), adult literacy, time (as a proxy for technological progress and other exogenous factors), and in some cases other variables are used as inputs to determine the shape of the production frontier. The efficiency measures are then used to compare the actual outcomes for the indicators in the latest period under review to the outcomes that would be observed under perfect efficiency.

TABLE 4-3: ENROLMENT RATES, TEST SCORES AND INPUT MEASURES FOR EDUCATION (1995–1999)

	Provincial average			Santa Fe		
	1995	1999	Avg. 1995–99	1995	1999	Avg. 1995–99
Net primary enrolment (% of students)	96.5	94.2	96.1	96.2	94.5	96.8
Net secondary enrolment (% of students)	70.2	71.5	72.1	66.3	68.5	66.4
Language test scores: primary (grades: 3, 6 & 7)	62.0	57.4	59.6	71.6	61.3	64.3
Mathematics test scores: primary (grades: 3, 6 & 7)	59.2	57.3	56.8	71.0	61.6	63.5
Language test scores: secondary (year: 2 & 5)	58.0	57.7	57.2	54.7	68.2	62.3
Mathematics test scores: secondary (year: 2 & 5)	46.8	58.4	53.6	49.2	72.0	60.9
GDP, pc (const 1999 pesos)	7,092	7,101	7,204	7,206	7,329	7,443
Expenditure: Education, pc (const 1999 pesos)	358	376	349	261	272	258
Adult literacy (% of population)	97.6	98.0	97.7	98.0	97.8	97.9

Sources: UNICEF (Argentina), Ministerio de Economía and Ministerio de Educación

(7,443 pesos versus 7,204 pesos) and adult literacy (97.9 percent versus 97.7 percent) during this time but significantly below average for public expenditures on the sector (258 pesos versus 349 pesos).

Three separate models are used to estimate the relationships between the inputs and the best possible health outcomes that can be achieved by the provinces, with the differences between the models consisting in the inclusion of per capita GDP, per capita public education expenditure, or both. The complete estimation results are available in Jayasuriya and Wodon (2003). The main conclusions are as follows:

- While an increase in per capita GDP does not have a statistically significant impact on net primary and secondary enrolment, it does improve test scores, although not by very large amounts. An increase in per capita income of 1,000 pesos increases language test scores by 0.6 to 0.7 points. The impact on mathematics test scores is similar in magnitude, ranging from 0.5 to 0.9 points.
- Net primary enrolment is apparently decreasing over time, but this is because of the unexplained drop in 1999 which may be due to data problems. Enrolment in secondary school, by contrast, improves with each additional year, by almost half a percentage point.
- Adult literacy has a strong positive impact on primary and secondary enrolment, but not on test scores once we control for per capita GDP in the regressions.
- Increasing broad-based per capita public expenditures for education does not have a positive impact on any of the outcomes.

Table 4-4 provides the efficiency measures for the education outcomes using Model I which included both per capita GDP and education expenditures. In most categories, Santa Fe outperforms the provincial average. The only exception is with respect to secondary school enrolments, where it is significantly below the average. This is because until 2000, the secondary enrolment rate in Santa Fe lagged the national average, so the relatively low efficiency rate is not surprising since outcomes were poor. Performance at the secondary level in Santa Fe has improved over time, however. Also, the fact that Santa Fe is doing relatively well for test scores may suggest that weaker students were dropping out of school before taking tests, but this may also have changed in recent years, in conjunction with the overall increase in enrolment.

Using the estimates of efficiency obtained in Table 4-4, Figure 4-7 compares the actual outcomes (latest data point available) to the outcomes that could be reached under perfect efficiency

TABLE 4-4: EFFICIENCY MEASURES FOR ENROLMENT AND EDUCATION QUALITY (1995–1999)

	Provincial average	Santa Fe
Net primary enrolment	98.958	99.453
Net secondary enrolment	85.255	80.822
Language test scores: primary (grades 3, 6 & 7)	91.355	97.191
Mathematics test scores: primary (grades 3, 6 & 7)	89.755	98.232
Language test scores: secondary (year 2 & 5)	87.236	94.166
Mathematics test scores: secondary (year 2 & 5)	85.841	94.756

Source: Jayasuriya and Wodon (2003).

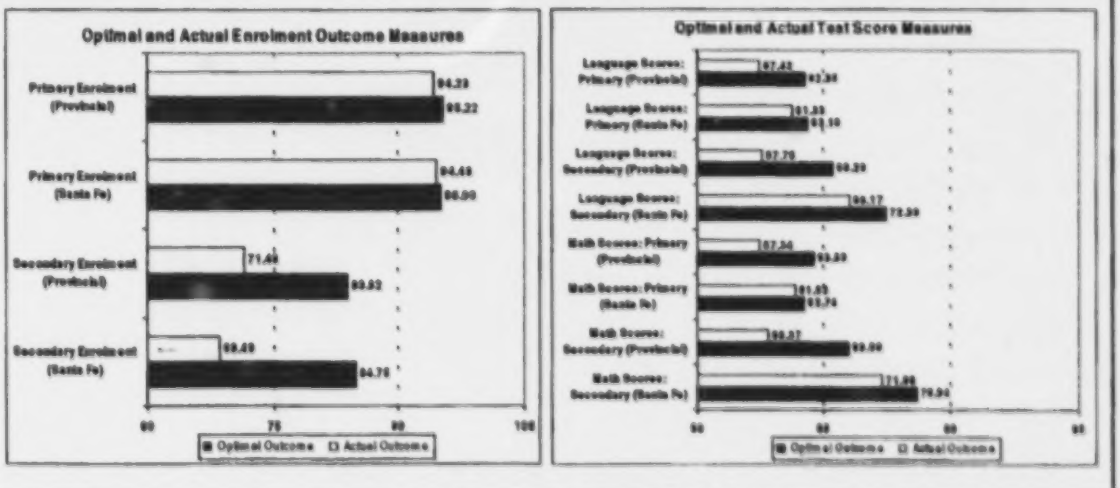
for Santa Fe and for all provinces on average. The figure suggest that the scope for efficiency gains in secondary schooling is higher than in primary schooling. This holds true for reaching better net enrolment outcomes as well as for reaching better test scores for both language and mathematics.

Estimating Efficiency in Reaching Health Targets

Two health outcome measures are considered in this section: infant mortality and child (under 5) mortality. The same methodology is used for health as was used in education. Six inputs are considered in the provincial health production functions: per capita GDP, per capita expenditures on health, the adult literacy rate, the rate of access to public hospitals, the rate of access to potable water and time to capture potential technological progress.

Basic statistics for the health outcome and input measures are provided for the period 1995 to 1999 in Table 4-5. The infant non-mortality rate (per 100) and child non-mortality rate (per 100) are used as health outcome measures. These non-mortality rates are defined as one hundred minus the corresponding mortality rates in order for the production frontier formulation to have larger numbers depicting better outcomes. Santa Fe fares better than the provincial averages for both infant and child non-mortality (98.380 versus 98.005 for infants and 98.147 versus 97.653 for children under five). Input use in Santa Fe to reach these outcomes is above the provincial average

FIGURE 4-7: OPTIMAL AND ACTUAL ENROLMENT AND TEST SCORE MEASURES



Source: Authors' estimation from Table 4.

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TABLE 4-5: INFANT AND CHILD NON-MORTALITY RATES AND INPUT MEASURES FOR HEALTH (1995–1999)

	Provincial average			Santa Fe		
	1995	1999	Avg. 1995–99	1995	1999	Avg. 1995–99
Infant non-mortality, per 100†	97.8	98.2	98.0	96.2	98.5	98.4
Child non-mortality: Age under 5, per 100†	97.4	97.9	97.7	98.0	98.3	98.1
GDP, pc (const 1999 pesos)	7,092	7,101	7,204	7,206	7,329	7,443
Expenditure: Health, pc (const 1999 pesos)	150	153	147	64	66	62
Adult literacy (% of population)	97.6	98.0	97.7	98.0	97.8	97.9
Access to public hospitals (# of births)	17,592	17,714	17,984	28,317	29,318	31,118
Access to potable water (% of population)	89.8	NA	NA	80.0	NA	NA

Sources: ENOHSA, Ministerio de Salud y Acción Social, Ministerio de Economía and UNICEF(Argentina);
†non-mortality are rates used in the estimation. NA means not available (only 1995 data for water access).

for per capita GDP and adult literacy but less than half the provincial average for per capita public expenditures on health (62 pesos versus 147 pesos) and also lower for access to potable water (80.01 percent versus 89.77 percent).

As with education, three separate models (to test for the robustness of the results) are used to estimate the relationships between the inputs and the best possible health outcomes that can be achieved by the provinces. The differences between the three models lie in the inclusion of the per capita GDP and per capita public health expenditure variables. The complete estimation results are available in Jayasuriya and Wodon (2003). The coefficients estimates suggest the following:

- Per capita GDP has a positive and statistically significant impact on infant and child mortality. An increase in per capita income of 1,000 pesos reduces infant and child mortality by 0.5 to 0.7 per 1,000 births. While this is not large, it is not negligible either given that the average provincial rate is around 20 per 1,000.
- Time also has a positive and statistically significant impact on outcomes, with each additional year reducing infant and child mortality by 0.8 to 0.9 per 1,000 births. The impact of time is thus larger than that of per capita GDP, a fact observed in many countries and probably due to progress in medicines and care.
- The impact of per capita health expenditures is, by contrast, rather weak. While spending has a positive and statistically significant impact when per capita GDP is not included in the specification, this impact vanishes when controlling for GDP.
- The other three variables, namely the adult literacy rate, the rate of access to public hospitals, and the rate of access to potable water, all lack statistical significance. This is not especially surprising, although in countries with lower rates of adult literacy, there is empirical evidence that improvements in literacy generate better health outcomes. This may not be the case in Argentina, however, since literacy rates are high—above 95%.

Given that we use three models to test for the robustness of our results to the assumptions used for the models, we have three different estimates of efficiency, but these do not change very much from one model to the next. As shown in Table 4-6, efficiency in reaching better health outcomes for infant and child mortality in Santa Fe is fairly high, and in fact higher than the efficiency measures observed in other provinces. The fact that all efficiency measures are high should not be surprising given the way the measures must be interpreted. For example, in the preferred specification of Model I for 1999, an efficiency measure of 99.81 in Santa Fe (15.21 per 1,000) means that under

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TABLE 4-6: EFFICIENCY MEASURES FOR HEALTH OUTCOMES (1995–1999)

	Provincial average	Santa Fe
Infant mortality, Model I†	99.438	99.810
Infant mortality, Model II†	99.451	99.912
Infant mortality, Model III†	99.412	99.755
Infant mortality: Age under 5, Model I†	99.395	99.850
Infant mortality: Age under 5, Model II†	99.367	99.911
Infant mortality: Age under 5, Model III†	99.397	99.853

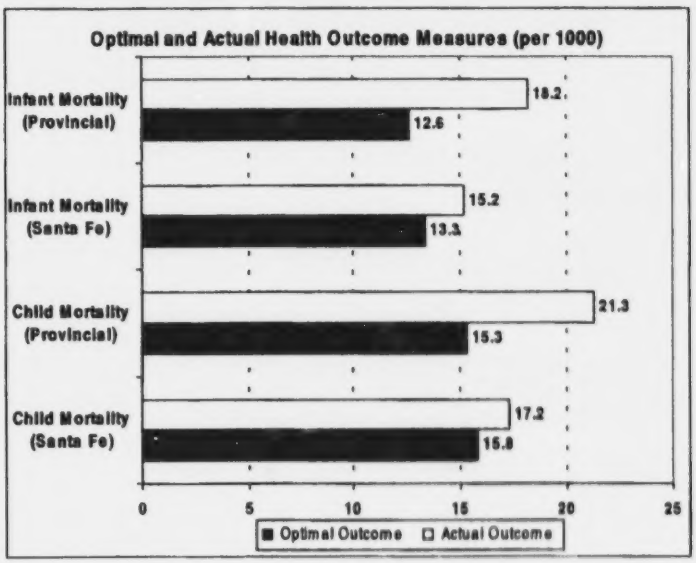
Source: Jayasuriya and Wodon (2003). †non-mortality are rates used in the estimation.

better efficiency, infant mortality could be improved by up to 0.19 percentage points (13.33 per 1,000), with the inputs available to the province. This efficiency improvement of 0.19 percentage points would represent a reduction in infant mortality of 12.4 percent, which is substantial (in real terms: 1.88 per 1,000). In other provinces, the reduction in infant and child mortality from an improvement in efficiency could be larger in absolute terms, since the efficiency measures are lower.

Using the estimates of efficiency obtained in Table 4-6, Figure 4-8 compares the actual infant and child mortality outcomes (latest data point available) to the outcomes that could be reached under perfect efficiency for Santa Fe and for all provinces on average. The figure suggests that the scope of efficiency gains for Santa Fe is smaller than for the provincial average, because efficiency is higher.

In summary, the province of Santa Fe performs relatively well in terms of efficiency measures in both education and health when compared to other Argentine provinces. The main exception is secondary school enrolments where it is considerably below the average. The efficiency findings also suggest that while Santa Fe is currently doing well, there are opportunities for improving out-

FIGURE 4-8: OPTIMAL AND ACTUAL HEALTH OUTCOME MEASURES



Source: Authors' estimation from Table 6.

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comes with no increase in expenditures. These findings are useful to consider in the context of the current crisis, where incomes have fallen and public expenditures have been cut. It may be the case that social indicators can be maintained even during the crisis since many of the factors influencing them, such as literacy rates in education, are not subject to such drastic shifts.

The empirical results presented here also suggest that general increases in public spending on health in the past have not had large impacts on infant and child mortality rates. In education, the evidence is even more stark with no significantly statistical relationship between public spending on the sector and education outcomes. This doesn't mean, however, that government policies and programs are incapable of improving results in health and education. For example, in 2000 five percent of infant deaths were related to respiratory conditions or problems and six percent were related to intestinal or parasite infections, both of which can be dealt with using appropriate and targeted interventions if detected in time. Over half of infant deaths—54%—were related to problems occurring in the first 28 days of life and many of these problems are also treatable if detected in time, but they may require costly interventions or advanced diagnostic capabilities and thus may be difficult to address in many communities. It may also be the case that indicators of social well-being, such as infant mortality, are sensitive to public expenditures when they fall below a given minimum level, which could be reached during the crisis. This can motivate attention to issues such as service delivery and performance monitoring and evaluation techniques which are discussed next.

Strengthening Service Delivery

What are the steps that can be taken so that Santa Fe, and Argentina, can accelerate progress toward reaching development targets, including the MDGs? In education, as well as in health, the public sector is the primary service provider, especially for low-income families who have limited or no access to private institutions. Unfortunately, as discussed in the previous section, empirical studies often find little relationship between public spending on social sectors and indicators of social well-being. One of the reasons for this disconnect may be failures in the delivery of public services. This section identifies weaknesses in public service delivery in Argentina and suggests ways that it could be strengthened.

Before proceeding it is important to note that many factors affect indicators such as infant or maternal mortality and they aren't all in the health sector. The same is true for education outcomes such as learning basic concepts or primary completion rates—and not all of these have to do with education services. In health, for example, education of the mother and access to clean water can have a powerful effect on the health of newborns. Similarly, the health of a child, including adequate nutrition, affects his or her ability to learn as can access to infrastructure, such as roads, which facilitate attendance at school. So not only must service delivery be improved in health and education, but linkages between these sectors and others, such as agriculture and infrastructure, must be better understood and addressed so that maximum results are achieved.

In the 1990s service delivery in Argentina went through a significant reform process, especially in education. Provinces took over management of all primary and secondary schools and financial resources were partially redistributed from the national to the provincial governments to cover these costs. One of the objectives of this reform process was to strengthen accountability at the local level as well as increase the autonomy afforded to service providers. Unfortunately, in 2002, public services in Argentina continue to perform below expectations. This section identifies some of the most important challenges facing service delivery in Argentina with a focus on improving results in the health and education sectors.

1) **Corruption.** Argentina is perceived to have widespread corruption in its public sector. The international watchdog group, Transparency International, ranked Argentina as 57th out of 91 countries on which they reported in 2001. Argentina had a score of 3.5 on the Corruption Perceptions Index used by the group, lower than Panama, Colombia, Mexico and

Brazil in Latin America and below Egypt, Turkey and many Eastern European nations.[16] Argentina's poor performance is even more evident when evaluated against income. That is, Argentina performed significantly below average on corruption measures for a country of its income level (Kaufman et al., 1999).

The perceived high level of corruption distorts incentives in many ways, including in addition to the obvious misuse of public resources, reducing citizen trust, interest and participation in government operations and services and contributing to poor morale and low expectations among government workers.

2) **Lack of performance incentives in the public sector.** In most instances, public employees are not subject to a professional performance evaluations. Bad performance may only slightly affect a career path and good performance may not be rewarded. For example, in the education sector, performance evaluations rated 80 percent of teachers as "excellent", with no substantive basis for such reviews (World Bank, 2001).

The strong political power enjoyed by unions, especially teachers unions, has contributed to a situation where performance evaluations are not taken seriously. It is difficult to fire teachers or to transfer them between schools once they have attained seniority. Without political support to confront the unions, the information on performance seems useless and yet without a credible accounting of poor performance or other abuses, it is difficult to muster the political will to take action.

This is the situation in Santa Fe, where the lack of timely, accurate and credible information on performance of both students and teachers complicates management of human resources in the Ministry of Education. The vast majority of the budget for the Ministry of Education is dedicated to personnel expenditures. If one takes only personnel directly employed by the Ministry, the figure was 72% in 2000, but if subsidies to private education which support teacher salaries are included, the figure jumps to over 90% (Morduchowizc and Iglesias, 2001). This is a very high level of personnel vs. other expenditures in an educational system (a reasonable norm is closer to 70%) and is indicative of the power exercised by the teachers' union in Santa Fe.

Labor contracts for teachers in Santa Fe make it difficult to efficiently manage human resources, especially in moments of change, such as the province is currently facing with implementation of the national reform program. It is extremely difficult to fire teachers, or even move them between schools once they have seniority. The system does include performance evaluation procedures but these are not being applied in a credible and uniform manner and the information they produce is not being used to inform decisions. As will be discussed later in this chapter, the Ministry of Education is currently upgrading its information systems so that it will have the data necessary to better manage human resources and monitor learning outcomes.

In some instances privatization can provide incentives for improved performance and directly lead to better outcomes. Recent empirical evidence by Galiani, Gertler and Schargrodsky (2002) indicates that the privatization of water concessions in Argentina in the 1990s significantly reduced child deaths and that the effect was greatest in the poorest areas. Overall, child mortality fell by 5 to 7% in areas which had water services privatized and in the poorest municipalities the reduction was an astounding 24%. The authors estimate that on a yearly basis, the lives of 375 young children were spared due to access to clean water. The main avenue by which the privatizations reduced mortality was by increasing access to clean water. Since higher income households in Argentina were already connected to the water system, private service providers had incentives to increase access to lower-income communities which were previously unconnected. Lack of investments by

16. From the June 27, 2001 press release of Transparency International, found at http://www.transparency.org

the public utility in the decade prior to privatization had meant that service did not keep pace with development, especially in the marginal suburbs of urban centers. The authors found that privatization of water concessions had a significant impact on deaths from water-born illnesses but not on other possible causes of mortality, such as accidents, pointing to the importance of the privatization of water on health outcomes.

3) **Limited autonomy and citizen participation at the service provider level.** At the level where services are provided—in the hospital, health clinic or school—those ostensibly in charge often find they have little room for decision. Budgets and staff are fixed and cannot easily be shifted, programs are designed by Ministry officials in the provincial or national capital, medicines or textbooks are provided centrally. In terms of participation, the poor who most need public services, also have the most difficult time making their concerns heard. Government services are still not perceived as responsive to the concerns of citizens nor are there adequate mechanisms in place to report problems of poor service or corruption.

A recent study on the education sector in Argentina, "Autonomy, Participation, and Learning in Argentine Schools," by Eskeland and Filmer (2002), documents the importance of these factors for improving education outcomes. The authors use a cross-sectional data set of academic performance in mathematics and language from the 6th and 7th grades to test whether the autonomy enjoyed by school administrators and the participation of parents in the school affect learning outcomes. They find evidence that both autonomy and participation strengthen education results.

In Santa Fe, an innovative program designed to address the demand-side of the equation for secondary education and increase participation has had notable success. In rural areas, an innovative program of self-paced learning seems to have successfully addressed the problems posed by the extension of primary education through the 9th grade. Students who complete the 7th grade in rural schools in Santa Fe can continue their education through the 9th grade using a specially designed auto-didactic curriculum. Students still attend their primary school, and can seek limited help from teachers of the lower classes, as well as receive instruction on a weekly basis from specialized teachers in math, language, science and other subjects who travel between rural schools. This program has a lower than average per-pupil cost, students have lower repetition rates than average and performance in the polimodal curriculum or high school, if they continue, has been strong. This program is seen to address the demand-side concerns of students and their parents, who would like the opportunity to continue their education but who do not want to leave their rural home to study in towns or cities at a relatively young age.

While of a different sort, another type of participation concerns the interaction between provincial and national policy makers, through the National Committee for Health and National Committee for Education (Consejos Federales de Salud y de Educación). Researchers evaluating the institutional capacity in Argentina for reform in these two sectors found that the extensive use of this consultative body in education, composed of provincial and national sector ministers and other experts, was a key element in the successes enjoyed in the education reform project. By the same token, the fact that the similar body in health was not engaged in health reform plans reduced the effective implementation of the health reform project (World Bank, 2001).

Towards a Performance Measurement and Management System

One of the ways to address the service delivery issues discussed above is through performance-based monitoring and evaluation (M&E) systems. Focusing on measurable indicators of government performance and related outcomes can become an important factor in achieving goals related to economic growth and social development. Documenting results not only provides valuable information for public sector management, it also enables governments to more effectively communicate with their citizens and demonstrate the impact of policies and programs. Transparent

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reporting on performance and results can encourage participation of citizens in programs, so that they can contribute to—and exert pressure toward—improving the delivery of public services.

As discussed elsewhere in this volume, a performance-based M&E system involves a series of steps to become fully operational. The system must be aligned and coordinated from one level of government and decision-making to another so that data collected at one step in the process is demanded and used for setting resource allocations and priorities on down (or up) the line. In Santa Fe, there are many instances where greater alignment and coordination could be enhanced. For example, strategic planning in the provincial government of Santa Fe is not a central function. Rather, each ministry is responsible for elaborating a strategy for their sector. These plans are developed between September and December for the following calendar year but are only officially presented as a group by the Governor to the Legislature in May—half-way into the year which they cover. There is also no clear linkage between the strategic plans and budget allocations. In fact, since Governor Reutemann returned to the executive office in 1999, the budget allocations for the different ministries have changed little from year to year. This has been because of the economic recession facing the country and province which has limited revenues, the conservative fiscal policies followed by the Governor and his Treasury Ministry, and the high fixed costs (for salaries or infrastructure) in many ministries which make year to year budget shifts difficult.

The impact of the current crisis is to further weaken attention to planning as policy makers focus on addressing the immediate impact of budget shortfalls and increased demand for services in their specific areas of work. This has been particularly true in the Ministry of Health, which has experienced a sharp increase in demand for services combined with rapid increases in the cost of basic inputs, such as medicines. By comparison, the Ministry of Education has not felt as directly the impact of the crisis since demand for services is more constant and there are relatively few imported inputs.

It is also worth noting that there is no alignment between the reporting units used by health, education and other ministries. For example, the Ministry of Health has organized the province into eight sections whereas the Ministry of Education divides the province into nine units. In neither case do these units, which are the basis for statistical reporting on performance in the sector, correspond to political lines such as departments or municipalities. It is thus difficult for elected representatives to clearly identify the performance of health or education in their constituencies, since the statistics are based on ministerial divisions of the province, not politically recognized units. The lack of harmony between the different types of data collected hampers the effective use of information systems while the lack of articulation between data, the budget process, the allocation of resources and decisions hampers efforts for improved governance.

While the crisis has increased the challenges facing the health and education ministries in Santa Fe, it may also provide an opportunity for change as the government tries to maintain services and improve performance with fewer resources. Although the current crisis atmosphere is having a paralyzing effect in many government offices, the overall performance history of Santa Fe suggests that this could be shifted to problem-solving if provided the right incentives. There are innovative pilot programs within the health and education ministries which could serve as early models for a possible results-based M&E system that is well-grounded within institutional capabilities. Thus, when the province is ready to move towards a results focus, it will be able to draw on these experiences and potentially begin the phasing in of management changes. These pilot programs include:

- The Ministry of Education is focusing on building institutional capabilities for data management through PRODISE, which is expected to provide tools and data management hardware capabilities including generation of baseline data and setting of quantitative targets. Another program, SIGAE (School Management and Administration System) is to generate information that can be used for management and strategy design purposes, such as designing strategies to improve quality of education. Lessons learned from these programs can provide critical elements for a results-based M&E system.

- The goals of health reform in the province of Santa Fe are to increase primary health care services, improve the management in the hospitals, and establish a policy framework for the regulation of the public-private components of the health sector. To achieve these goals, the Ministry of Health is engaged in two results-oriented initiatives. Both of these pilots in the Ministry of Health (MOH) can be used as models for wider sector results-based monitoring and evaluation.
  1) The ***indigent insurance*** scheme incorporates incentives for providers who receive financial compensation for increasing coverage above and beyond the mandatory level. This may include services such as prenatal care, prenatal screening, TB control, youth and child development, family planning and cancer prevention in women and others (including domestic violence, alcoholism, leprosy (16–20 new cases per year) and teen pregnancy). The baseline for the pilot insurance program was conducted in August–December of 2001 and there is a system in place that collects data on services performed. Periodically program managers look at outcome indicators such as delivery outcomes or infant growth and development. While far from perfect–for example, the budget is not linked with service areas–the indigent insurance program encourages managing towards results and may be able to provide a "quick win" opportunity for testing a results-based monitoring and evaluation system.
  2) *Hospital management contracts* represent another promising initiative. These are renewable six-month contracts, which make the MOH and the hospitals partners in improving the management of the hospitals. As much as 70 percent of the MOH budget in Santa Fe is devoted to hospital operations, and 90 percent of health providers work in curative care. With the increased demand for services and falling real budgets, the MOH had to find a strategy that would energize hospitals into becoming more effective and efficient while at the same time increasing the quality of their services. This reform is focusing not on what services are provided, but on how those services are being provided, including their costs.

Conclusion

This country study reviewed Argentina's progress toward the Millennium Development Goals and the relevance of these goals in a middle-income country currently beset by a severe economic crisis. The study also analyzed the factors influencing some of the key MDGs, such as infant mortality and school enrolments and the efficiency of provincial governments–Santa Fe in particular—in achieving the outcomes. These findings suggested that total expenditures on health or education are not the primary drivers in outcomes and that efficiency improvements would contribute to improved outcomes. The final section reviewed improvements in service delivery and performance monitoring and evaluation as ways to accelerate progress on the goals, even in the context of shrinking budgets. The main conclusions from this work are as follows:

1. The Millennium Development Goals are relevant for Argentina and have significant overlap with already established national and provincial goals and targets. This is particularly true with respect to the health sector, where both national and provincial goals for Santa Fe were developed with reference to UN conference objectives. In education, there is less overlap between national and global goals, but emphasis on primary school completion and achievement is seen as an important issue to be addressed, if not primary school enrolment, which is quite high by most measures.
2. Argentina made solid progress toward the goals between 1990 and 2000, a time of relative prosperity and reductions in poverty. For many of the goals, however, the rates of progress in the 1990s are not sufficient to meet the MDG targets by 2015. Further, the severe crisis besetting the country since 2001 has greatly worsened some indicators, such as the poverty rate, calling into question the country's ability to maintain previous achievements, much less accelerate progress in the short or medium term.

3. Analysis of the factors affecting outcomes in health and education, using provincial level data, suggest that income levels have a relatively small effect on indicators such as infant mortality and school enrolments. Data on public expenditures shows no relationship to health and education outcomes. These findings suggest the importance of identifying specific, targeted approaches to improving indicators.
4. Two approaches are identified for strengthening Argentina's ability to meet the Millennium Development Goals–improvements in service delivery and adoption of performance monitoring and evaluation techniques. An example of service delivery assisting in the achievement of the MDGs is the privatization of water concessions in Argentina in the 1990s, which improved access to clean water and reduced infant deaths by 5 to 7% in communities which benefited from these private concessions. In terms of performance M&E, Argentina has yet to adopt these techniques across government, although performance contracts, for example with public hospitals in Santa Fe, are beginning to be introduced. While the current crisis atmosphere is not conducive to long-term planning and widespread introduction of M&E techniques, there are clearly opportunities to enhance efficiency—which are vitally important in times of budget cuts—and which may contribute to greater attention to empirically based policy reviews that could lay the basis for future adoption of performance M&E.

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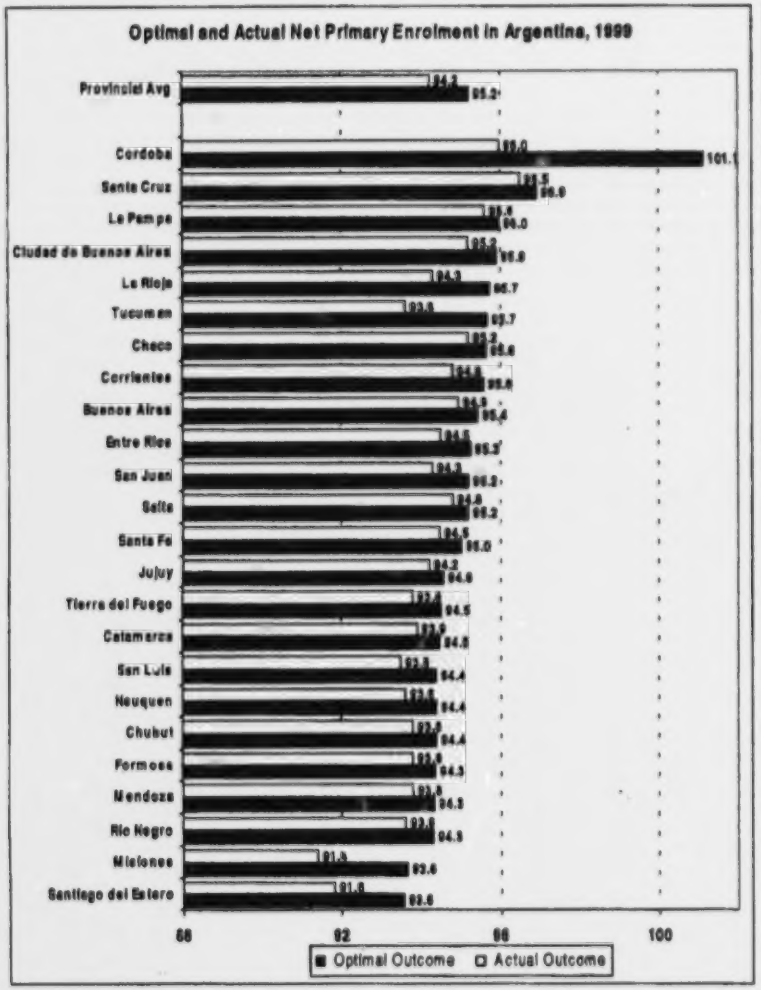
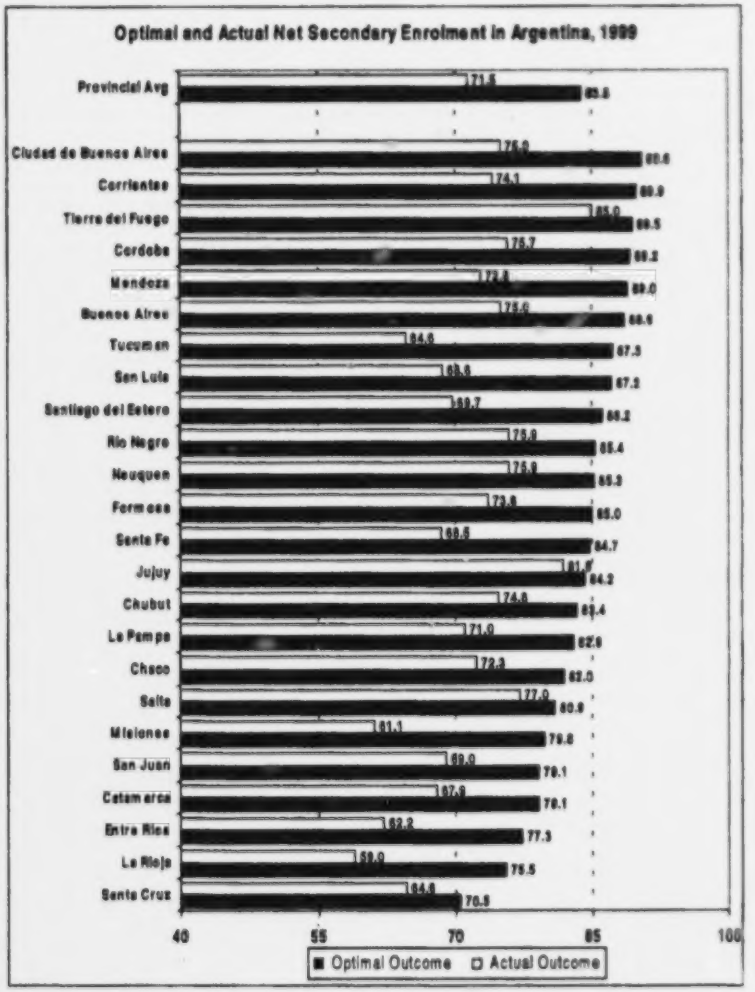
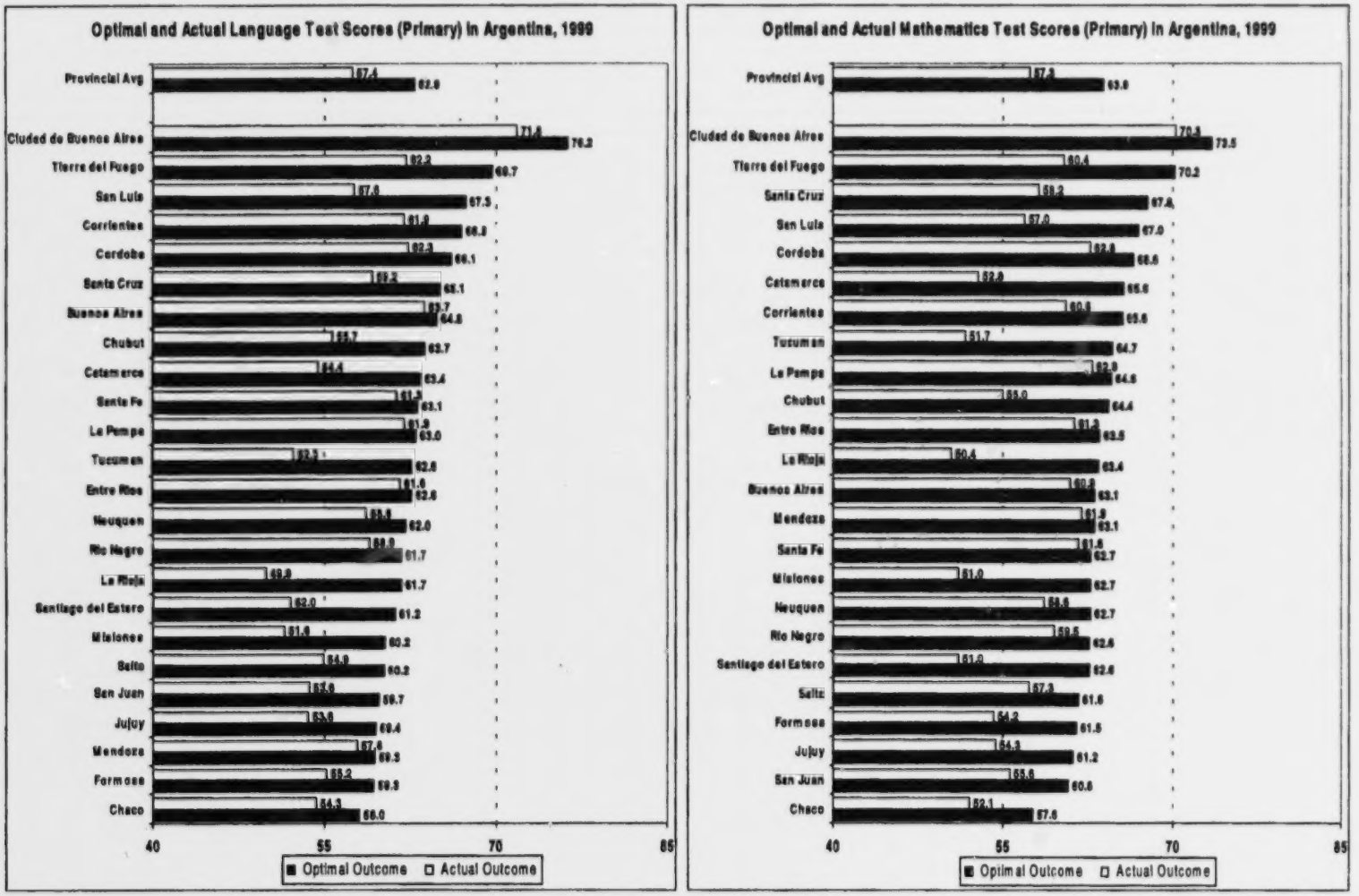
APPENDIX FIGURE A4-1: OPTIMAL AND ACTUAL ENROLMENT OUTCOME MEASURES BY PROVINCE IN ARGENTINA, 1999





Source: Authors.

APPENDIX FIGURE A4-2: OPTIMAL AND ACTUAL TEST SCORE MEASURES (PRIMARY) BY PROVINCE IN ARGENTINA, 1999



Source: Authors.

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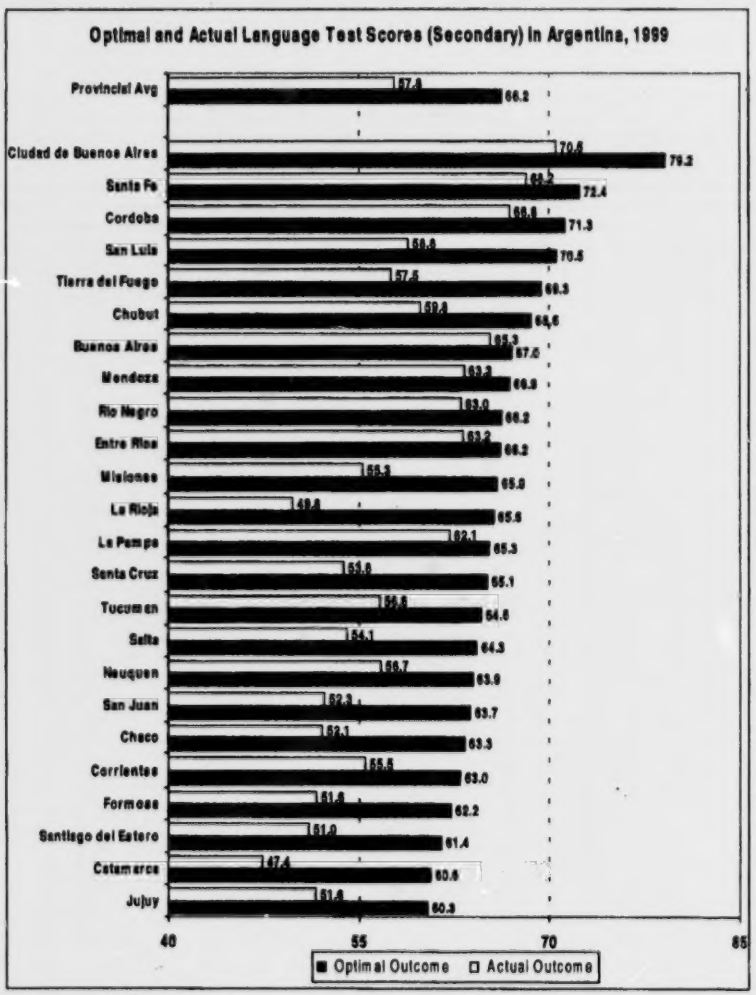
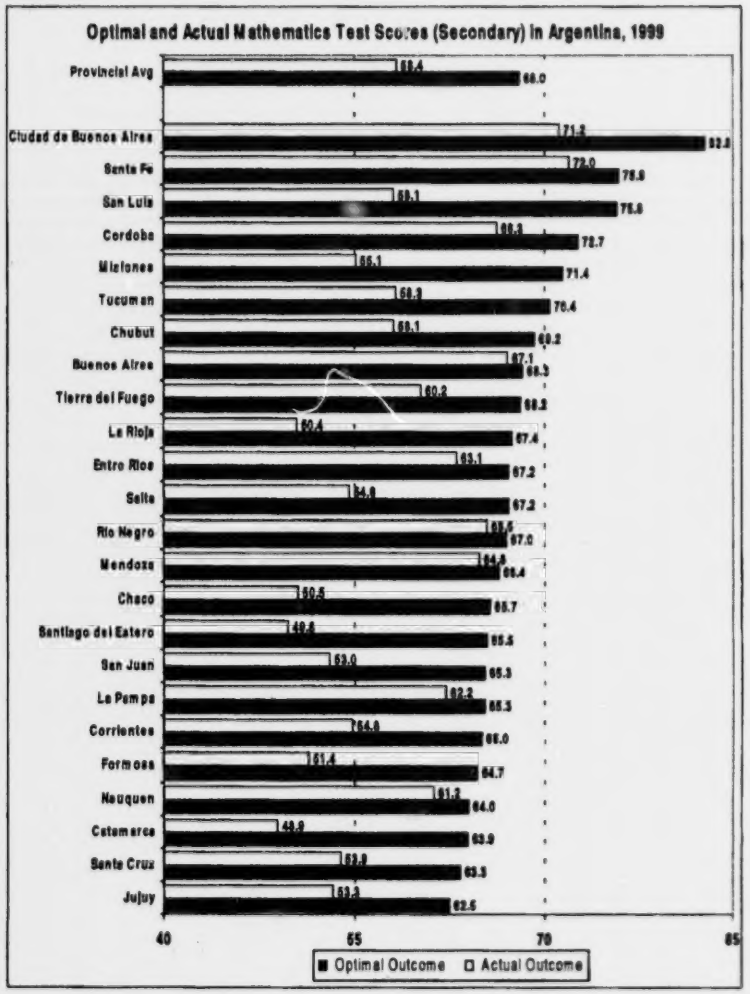
APPENDIX FIGURE A4-3: OPTIMAL AND ACTUAL TEST SCORE MEASURES (SECONDARY) BY PROVINCE IN ARGENTINA, 1999





Source: Authors.

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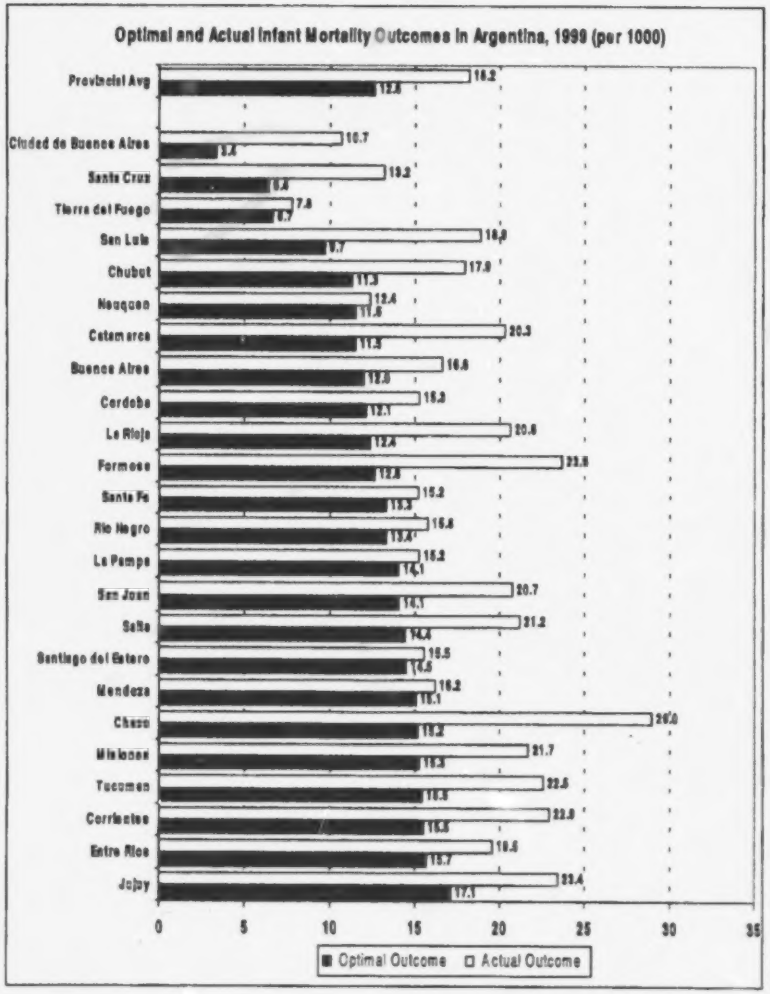
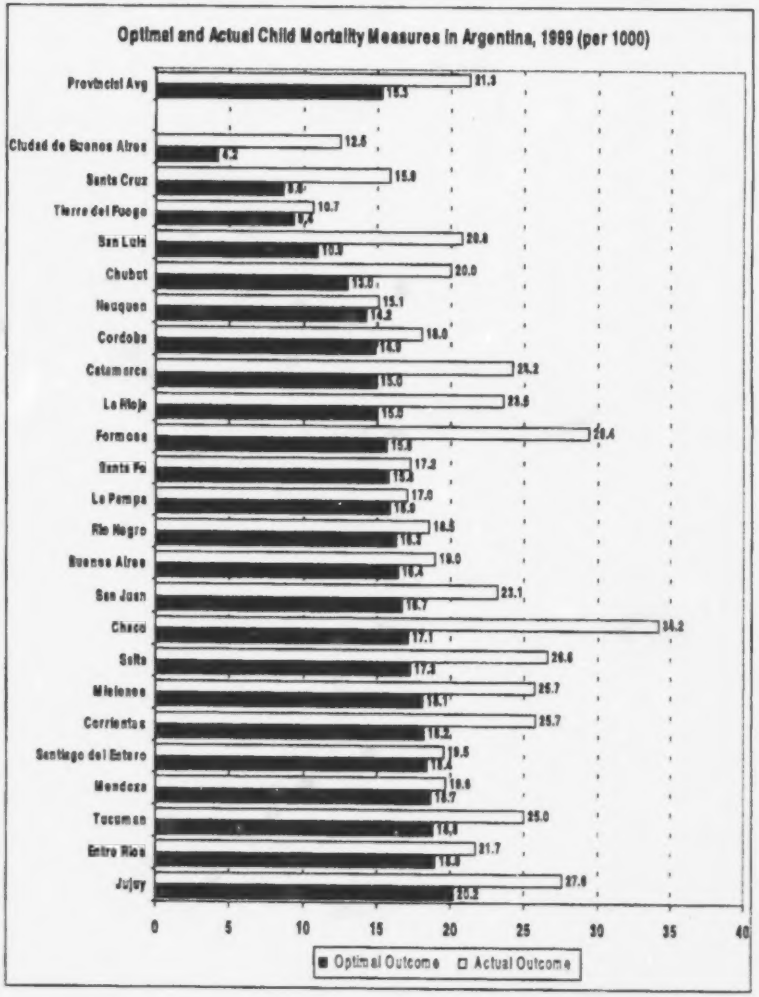
APPENDIX FIGURE A4-4: OPTIMAL AND ACTUAL HEALTH OUTCOME MEASURES BY PROVINCE IN ARGENTINA, 1999





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CHAPTER 5

DEVELOPMENT TARGETS AND EFFICIENCY IN IMPROVING EDUCATION AND HEALTH OUTCOMES IN MEXICO'S SOUTHERN STATES

Ruwan Jayasuriya and Quentin Wodon[17]

Introduction

In September 2000, the Millennium Declaration was approved at the United Nations. The declaration provides ambitious development targets—the so-called Millennium Development Goals (MDGs hereafter), among others for the reduction of poverty and hunger, the improvement of education and health indicators, and progress in other areas such as gender equality and environmental sustainability. Unlike for Mexico as a whole where good progress towards the MDGs is observed, the southern part of the country (i.e., the states of Chiapas, Guerrero, and Oaxaca) may very well not reach many of the MDGs. The objective of this chapter is to document this assertion and discuss some of the constraints towards reaching the MDGs in the south, as well as some initiatives recently taken to make faster progress.

In the first section of the chapter, we start by providing a brief diagnostic regarding how much progress has already been achieved towards reaching the MDGs in Mexico as a whole and in the south, and in some cases (e.g., for poverty) we estimate how much additional progress is likely to be achieved in the years ahead. Thereafter, we focus on the question of whether improvements in efficiency in the provision of basic services would help in improving outcomes in the south, with a focus on health and education. Finally, we discuss the existing evidence on the impact that programs such as PROGRESA have had on progress towards reaching some of these goals.

The main questions and conclusions are as follows:

Will Mexico and especially the southern states reach the MDGs? Preliminary estimates suggest that while Mexico as a whole may be able to reduce extreme poverty by half by 2015, the southern states will need to sustain high growth scenarios to achieve the same result. At the country level,

17. We are grateful to Gladys Lopez-Acevedo for providing part of the data used in the efficiency analysis of this policy note, and to Corinne Siaens for estimating future poverty measures under alternative scenarios.

reducing malnutrition rates by half and achieving universal primary completion could well be achieved, but the reduction of infant and child mortality by ⅔ may be more of a challenge, as is the case in other countries. Beyond the issue of reaching targets, there is ample evidence that the southern states are lagging behind the rest of the country in many indicators, so that specific efforts will be needed in order to enable the south to progressively catch up with the country as a whole. As discussed below, well targeted human development programs are part of the answer.

Are the difficulties in the south due to a lack of resources, or a lack of efficiency? To analyze this question, we have performed a state level analysis of whether the lower values for a range of indicators in the south are due to a lack of resources, or a lack of efficiency in using existing resources.

- *Lack of resources:* While the analysis suggests that most of the lag observed in the south is due to a lack of resources, not all resources matter equally. We consider as "resources" a few key determinants of infant and child mortality, net primary and secondary enrolment, and test scores in primary school. A higher per capita GDP should improve health indicators, but not by much, and it may not have much impact on education outcomes. Broad-based per capita spending on education or health also seems to have little impact (suggesting the need for well targeted programs). By contrast, adult literacy (for both education and health indicators) and vaccination (for infant and child mortality) have positive impacts.
- *Lack of efficiency:* There are also in some instances issues with regards to the efficiency with which southern states use their available resources. In Guerrero for the infant and child mortality indicators, and in Chiapas for net primary school enrolment, efficiency appears to be a serious problem. Furthermore, given that the benchmark for the comparison of the efficiency of the southern states is the other Mexican states, and that there is probably room for efficiency gains throughout Mexico which are not captured in our analysis, the results suggest that some focus should be placed on improving efficiency in the use of inputs.

Are existing targeted programs appropriate for reaching the MDGs? Better assets will be needed in the south to catch up with the rest of the country. In order to build these assets, federal funding will be required, but efforts must also be made to ensure that local authorities at the municipal and state level have the capacity to absorb extra resources in a context of decentralized decision making. This is a first message that we would like to put forward in the conclusion of this chapter, which in a way follows up on the efficiency issue already mentioned. The second message is that given that broad increases in public spending for education and health may have only a limited impact on outcomes, it will remain necessary to rely on integrated and well targeted programs such as PROGRESA which generate human capital investments beneficial in the long run.

Development Targets: The Millennium Development Goals

The MDGs provide a simple framework for discussing development targets in Mexico and the southern states (see Box 5-1; for more information, see http://www.developmentgoals.org/). The main targets, together with a brief description of the position of Latin America, Mexico, and the southern states for the related indicators, are provided in Table 5-1. There is ample evidence that the southern states are lagging behind the rest of the country, so that specific policies will need to be implemented in order to enable these states to catch up with the country as a whole. In this section, we briefly review the progress to date for various MDGs, and for some indicators (e.g., poverty), we assess whether the south and Mexico as a whole are likely to reach the targets.

Poverty

Thanks to solid growth in the second half of the 1990s, Mexico as a whole has been able to offset the negative impact of the 1994–95 crisis on standards of living. This has also been observed in the south. As shown in Table 5-2, the share of the population with per capita income below what is needed to meet basic food needs (i.e., the share of the population in extreme poverty) increased between 1992 and 1996 from 54 percent to 60 percent. This increase has been more than compensated by 2000, with a level of extreme poverty of 46 percent in 2000 according to estimates based on the ENIGH survey.

BOX 5-1: THE MILLENNIUM DEVELOPMENT GOALS: A BRIEF DESCRIPTION

The MDGs were approved through the Millennium Declaration at the United Nations in September 2000. The first seven MDGs can be conveniently grouped into three categories (the eighth MDG relates to the development of a global partnership for development, which is beyond the scope of this chapter): a) Eradicating extreme poverty and hunger; b) Achieving universal primary education and promoting gender equality; c) Improving health outcomes and ensuring environmental sustainability.

Eradicating extreme poverty and hunger (Goal 1). The first MDG is the eradication of extreme poverty and hunger. To monitor progress, there are two targets. The first is to reduce extreme poverty by half between 1990 and 2015. Although progress towards that goal is measured at the international level with poverty measures based on a Purchasing Power Parity adjusted poverty line of one US dollar per day, in Mexico, progress could be assessed using country-specific poverty lines, as done here. The second target is to reduce by half the share of the population which suffers from hunger. The indicators for this target are the prevalence of malnutrition, as well as estimates of the share of the population without adequate dietary energy consumption.

Achieving universal primary education and promoting gender equality (Goals 2 and 3). The next two MDGs are to achieve universal primary education and promote gender equality. The target for universal primary education is the completion of a full course of primary schooling by boys and girls alike. There are three indicators to measure progress: the net enrolment ratio in primary education, the proportion of pupils starting grade 1 who reach grade 5, and the illiteracy rate of 15–24 year-olds. The target for gender equality and the empowerment of women is the elimination of gender disparities in primary and secondary education by 2005, and for all levels of education by 2015. The four indicators suggested for monitoring progress over time are the ratio of girls to boys in primary, secondary and tertiary education, the ratio of literate females to males of 15–24 year-olds, the ratio of women to men in wage employment in the non-agricultural sector, and the proportion of seats held by women in national parliament.

Improving health outcomes and ensuring environmental sustainability (Goals 4 to 7). The fourth and fifth MDGs are essentially to reduce child and maternal mortality. The targets for child mortality are to reduce by two thirds, between 1990 and 2015, the under-five mortality rate (with three indicators: the under-five mortality rate, the infant mortality rate, and the proportion of one year old children immunized against measles). The targets for maternal mortality are to reduce by three quarters, between 1990 and 2015, the maternal mortality ratio (with two indicators: the maternal mortality ratio itself and the proportion of births attended by skilled health personnel). The sixth MDG is also related to health: it consists in combating and reversing the spread of HIV/AIDS, malaria, and other communicable diseases. The seventh MDGs is to ensure environmental sustainability. While there are many indicators here, an important one consists in halving by 2015 the proportion of people without sustainable access to safe drinking water.

Education and Gender Equity

Enabling children to complete their primary education is clearly necessary for any development strategy in the south, because it will help the children to emerge from poverty when they reach adulthood. According to other work by the authors, when the household head has completed the primary education cycle, the individuals in the household have a level of per capita income on average 20 percent higher than if the head had no education at all. If the spouse also completes the primary education cycle, this generates an additional 14 percent gain in per capita income in the household. Having both the head and the spouse completing the primary education cycle thus increases the household's income by one third. Of course, investments in education will take time

TABLE 5-1: MEXICO'S SOUTHERN STATES AND SELECTED MILLENNIUM DEVELOPMENT GOALS

MDGs: Selected targets	Latin America and the Caribbean (LAC)	México	Chiapas, Guerrero, and Oaxaca
Reduce the share of the population in extreme poverty by half between 1990 and 2015.	Regional World Bank estimates suggest a reduction in the share of the population in extreme poverty from 20% in 1992 to 17% in 1998. Global World Bank estimates based on $1/day poverty lines suggest a reduction from 16.8% in 1990 to 12.1% in 1999.	The population's share in extreme poverty decreased from 23% in 1992 to 17% in 2000.	The population's share in extreme poverty decreased from 54% in 1992 to 46% in 2000. Of three growth scenarios suggested in this chapter, only the high growth scenario would enable the southern states to reduce extreme poverty in half by 2015.
Achieve universal primary education.	According to World Bank estimates, net primary school enrolment rates have increased from 89% in 1990 to 97% in 1999.	The enrolment rates in 2000 for 6–14 years-old was 92.8% according to census data.	The enrolment rates in 2000 for 5–9 years old was 79.7% in Chiapas, 83.9% in Guerrero, and 85.7% in Oaxaca. For 10–14 years old, the rates in the three states were 81.9%, 87.7%, and 87.8%.
Promote gender equity and empower women, in part through education parity.	According to World Bank estimates, the ratio of girls to boys in primary and secondary school has increased from 97.7 in 1990 to 98.7 in 1999.	For ages 5 to 9, there is parity in enrolment by gender. For ages 10 to 14, the gap is 0.6 percentage points in the 2000 census.	For ages 5 to 9, there are few differences in enrolment by gender. But for ages 10 to 14, the gender gaps in percentage points are 5.4 in Chiapas, 1.5 in Guerrero, and 3.2 in Oaxaca in the 2000 census.
Reduce the under five mortality rate by ⅔ between 1990 and 2015	According to World Bank estimates, infant mortality decreased in LAC from 41 per 1,000 in 1990 to 29 per 1000 in 2000.	According to CONAPO, the infant mortality rate in Mexico decreased from 36.6 per 1,000 in 1990 to 24.9 in 1997.	According to CONAPO, the infant mortality rate in 1997 was 31.9 per 1000 in Chiapas, 29.7 in Guerrero and 31.7 in Oaxaca.
Reduce the maternal mortality rate by ¾ between 1990 and 2015	There are no regional estimates for maternal mortality in the World Bank's web site on the MDGs.	According to CONAPO, the maternal mortality rate decreased from 5.4 per 10,000 pregnancies in 1990 to 4.7 in 1997.	According to CONAPO, the maternal mortality rates in Chiapas, Guerrero, and Oaxaca were respectively 6.3, 5.3, and 7.5 per 10,000 in 1997.

(*continued*)

TABLE 5-1: MEXICO'S SOUTHERN STATES AND SELECTED MILLENNIUM DEVELOPMENT GOALS (CONTINUED)

MDGs: Selected targets	Latin America and the Caribbean (LAC)	México	Chiapas, Guerrero, and Oaxaca
Reduce by half the population without access to an improved water source (there are also other environment-related targets)	According to World Bank estimates, access to an improved water source increased in LAC from 81% in 1990 to 85% in 2000. Access to improved sanitation increased from 72% in 1990 to 78% in 2000.	In the 2000 census, access to pipe water was 84% nationally, while access to sanitation was 78%. These access rates have improved substantially in the 1990s.	In the 2000 census, access rates to pipe water in Chiapas, Guerrero, and Oaxaca were 68.0%, 59.9%, and 65.5 %, while access rates to sanitation were 62.3%, 53.6%, and 45.6%. These access rates have improved substantially in the 1990s.

Source: For LAC, estimates are from http://www.developmentgoals.org/Data.htm, except the "regional" poverty estimates which are from Wodon et al. (2001). For Mexico, the sources are INEGI for education indicators, CONAPO for health indicators. Poverty estimates by the authors.

to bear fruits and reduce poverty (the children must become adults and make a living.) Still, education remains one of the best investments which can be made in order to provide long term opportunities to the population of the southern states.

As in Mexico as a whole, the southern states have made substantial progress towards educating their population. In Chiapas, the share of the population above 15 years of age with no education at all or with incomplete primary education, has decreased by 10 percentage points in the last 10 years, from 64 percent in 1990 to 54 percent in the 2000 census (Table 5-3). In Guerrero, the corresponding share has decreased by almost 8 percentage points, from 52 percent to 44 percent. In Oaxaca, the share has decreased by 10 percentage point, from 59 percent to 49 percent.

However, despite progress, the southern states are still lagging behind not only in terms of education levels among the adult population, but also in terms of school enrolment rates for children. As shown in Table 5-4, while the net enrolment rate in 2000 for 6–14 year olds was 92.8 percent at the national level in the 2000 census data estimates provided by INEGI, the rates for 5–9 year olds was 79.7 percent in Chiapas, 83.9 percent in Guerrero, and 85.7 percent in Oaxaca, and for

TABLE 5-2: SHARE OF THE POPULATION IN POVERTY AND IN EXTREME POVERTY, 1992–2000

	National			Urban			Rural		
	Mexico	South	Difference	Mexico	South	Difference	Mexico	South	Difference
	Share of population in extreme poverty according to per capita income								
1992	23	54	31	16	37	21	44	72	28
1996	31	60	29	19	36	17	61	81	20
2000	17	46	29	8	21	13	46	70	24
	Share of population in poverty according to per capita income								
1992	54	82	28	47	77	30	74	88	14
1996	61	83	22	52	70	18	85	94	9
2000	42	67	25	32	48	16	72	86	14

Source: Estimates provided by Corinne Siaens based on 1992, 1996, and 2000 ENIGH surveys.

TABLE 5-3: ADULT POPULATION IN THE SOUTHERN STATES BY EDUCATION LEVEL, 1990 AND 2000 CENSUS

	1990			2000		
	Total	Men	Women	Total	Men	Women
Chiapas						
No education (%)	29	22.8	35.1	22.9	17.7	27.9
Incomplete primary (%)	31	33.4	28.6	27	27.7	26.3
Complete primary (%)	13.8	15.2	12.6	17.3	18.1	16.6
Above primary (%)	22.8	25.9	19.8	31.9	35.7	28.3
Not specified (%)	3.4	2.8	3.9	0.9	0.8	0.9
Guerrero						
No education (%)	26.8	23.1	30.2	21.4	18.2	24.3
Incomplete primary (%)	21.9	22.6	21.3	20.1	20.3	19.8
Complete primary (%)	15.9	16.3	15.6	17.2	17.2	17.1
Above primary (%)	32.1	35.2	29.4	40.3	43.3	37.7
Not specified (%)	3.2	2.8	3.5	1	0.9	1
Oaxaca						
No education (%)	26	19.5	31.9	20.3	15.2	24.7
Incomplete primary (%)	29.3	31.6	27.2	24.8	25.9	23.9
Complete primary (%)	18.7	20.4	17.2	20.7	21.3	20.1
Above primary (%)	23.5	26.6	20.7	33.3	36.7	30.2
Not specified (%)	2.5	2	2.9	1	0.9	1.1

Source: INEGI.

TABLE 5-4: ENROLMENT RATES BY GENDER AND AGE GROUP IN THE SOUTHERN STATES, 2000 CENSUS

	Share enrolled (%)			Share not enrolled (%)			Status not specified (%)		
	Total	Hombres	Mujeres	Total	Hombres	Mujeres	Total	Hombres	Mujeres
Chiapas									
5–9 years	79.7	79.9	79.5	18.8	18.5	19.1	1.5	1.5	1.5
10–14 years	81.9	84.6	79.2	17.7	15.1	20.4	0.4	0.4	0.4
15–19 years	37.8	42.6	33.2	61.7	56.9	66.2	0.5	0.5	0.5
Guerrero									
5–9 years	83.9	83.7	84.2	14.6	14.7	14.4	1.5	1.5	1.5
10–14 years	87.7	88.4	86.9	12.1	11.3	12.8	0.2	0.3	0.2
15–19 years	45.9	47.6	44.2	53.9	52.2	55.5	0.3	0.3	0.3
Oaxaca									
5–9 years	85.7	85.6	85.8	12.9	13	12.9	1.4	1.4	1.4
10–14 years	87.8	89.4	86.2	11.9	10.3	13.5	0.3	0.3	0.3
15–19 years	43	46.3	39.8	56.6	53.3	59.8	0.4	0.4	0.4

Source: INEGI.

10–14 year olds, the rates were 81.9 percent, 87.7 percent, and 87.8 percent. In other words, in the three southern states, enrolment rates remain 5 to 10 percentage points below the national average. Furthermore, while at the national level the gender gap in enrolment for ages 10 to 14 is almost inexistent, the gaps are larger in the three southern states (5.4 percentage points in Chiapas, 1.5 percentage points in Guerrero, and 3.2 percentage points in Oaxaca).

Health and Access to Basic Infrastructure

In the MDGs framework, the key targets for health are to reduce infant and child mortality rates by two-thirds, and the maternal mortality rate by three-quarters between 1990 and 2015. An additional target is to provide access to all women to reproductive health services by 2015. Basic health statistics at the national level and in the southern states are provided in Table 5-5. Here again, the performance of the south is well below that of the country as a whole. The three southern states have the highest rates of fertility among the 32 states. As a result, the dependency ratios, which can be used to measure the burden on wage earners in a household to provide for other household members, are highest in the south. The three southern states have the lowest rates of life expectancy, and relatively high rates of infant and child mortality. This may be in part because the share of the population with health insurance is also much lower in the south than in the other states. It may also be due in part to the fact that the three southern states have much lower access rates to a range of basic infrastructure services, including pipe water, sanitation, and electricity. While almost three fourths of the population has access to all three services at the national level, the proportion is well below half in each of the three southern states, and as low as one third (37.8 percent) in the state of Oaxaca.

Assessing the Likelihood of Reaching the Millennium Development Goals in Mexico

How likely is it that Mexico and the southern states will reach the MDGs targets? For extreme poverty and poverty, the 2000 ENIGH survey can be used to answer this question under different growth scenarios, assuming that there is no change in inequality over time. The method consists in raising the per capita income of all households by the same real per capita GDP growth rate in the survey, and estimating again the poverty measures. For this exercise, we use the three growth scenarios. The low growth scenario for the southern states assumes for the period 2001–2006 a

TABLE 5-5: HEALTH STATISTICS AND ACCESS TO BASIC SERVICES IN THE SOUTHERN STATES, 2000 CENSUS

	National	Chiapas		Guerrero		Oaxaca	
	Rate	Rate	Ranking	Rate	Ranking	Rate	Ranking
Fertility rate	2.9	3.5	2°	3.7	1°	3.3	3°
Life expectancy	75.4	72.4	32°	73.3	30°	72.5	31°
Population with health insurance	40.1	17.6	32°	20.3	31°	22.6	30°
Dependency ratio	64	76.2	3°	80.6	1°	78.3	2°
Infant mortality rate							
Maternal mortality rate	5.3	6.6	4°	9.7	1°	6.4	6°
Access to basic services							
Pipe water	84.3	68	29°	59.9	32°	65.5	31°
Sanitation	78.1	62.3	28°	53.6	31°	45.6	32°
Electric energy	95	87.9	31°	89.3	29°	87.3	32°
All three services	71.8	48.1	30°	41.8	31°	37.8	32°

Source: INEGI.

growth rate of 2.2 percent, which together with a population growth rate of 1.2 percent yields a growth rate in per capita income of 1 percent per year. The base growth scenario assumes a growth rate of 3.0 percent, which yields a rate of growth in per capita income of 1.8 percent. The high growth scenario assumes a growth rate of 4.5 percent, which yields a rate of growth in per capita income of 3.3 percent per year. For comparability, we use the same growth rates for Mexico as a whole. Also, rather than predicting poverty with these growth rates until 2006, we go all the way to 2015 which is the date for reaching the targets in the MDGs.

Simulation results for income poverty measures are given in Table 5-6 (the results for the measures using per capita consumption are very similar and not presented here). The table provides the share of the population which can be expected to be poor or extreme poor in 2005, 2010, and 2015. The estimates for 1992 and 2000 are those already presented earlier. Under the low growth scenario, poverty and extreme poverty will not be reduced by half in 2015 in neither the country as a whole, nor the southern states. Under the base case scenario, extreme poverty will be reduced by half in 2015 in the country as a whole, but not in the southern states, and poverty will not be reduced by half in either. Under the high growth scenario, extreme poverty will be reduced by half in 2015 in both the country as a whole and in the southern states, but while poverty will also be reduced by half in the country as a whole, this will not be the case in the southern states, essentially because the starting level of poverty is so high.

What about other MDGs targets? Answering this question is more difficult due to the many factors which may affect education, health, and infrastructure outcomes. Still, tentative answers can be given (see Box 5-2 on the methodology). In Mexico, despite progress in reducing extreme poverty in the 1990s, Hicks and Wodon (2002) suggest that it is possible, but not guaranteed that the share of the population living in extreme poverty will be cut by half between 1990 and 2015. The same is true for the population in poverty. Progress towards a reduction in malnutrition in line with the MDG target is more likely. Reaching quasi universal net primary enrolment is also likely. By contrast, reaching the targets for infant and under five mortality is unlikely, not so much

TABLE 5-6: SHARE OF THE POPULATION IN POVERTY AND EXTREME POVERTY UNDER GROWTH SCENARIOS

	Per capita income growth of 1%		Per capita income growth of 1.8%		Per capita income growth of 3.3%	
	Mexico	South	Mexico	South	Mexico	South
Share of population in extreme poverty according to per capita income						
1992	23	54	23	54	23	54
2000	17	46	17	46	17	46
2005 (Estimated)	16	43	15	42	13	39
2010 (Estimated)	15	41	13	38	10	31
2015 (Estimated)	13	40	11	33	7	26
Extreme poverty reduced by ½	No	No	Yes	No	Yes	Yes
Share of population in poverty according to per capita income						
1992	54	82	54	82	54	82
2000	42	67	42	67	42	67
2005 (Estimated)	40	65	38	63	35	61
2010 (Estimated)	38	63	34	60	28	54
2015 (Estimated)	36	61	30	57	22	51
Poverty reduced by ½	No	No	No	No	Yes	No

Source: Authors, using 2000 ENIGH.

BOX 5-2: TECHNIQUES FOR ASSESSING THE REALISM OF DEVELOPMENT TARGETS

As noted in Christiaensen et al. (2002), three techniques can be used to asses the realism of targets: historical benchmarking, macro-simulations, and micro-simulations. Historical benchmarking uses basic information from the past in order to suggest targets for the future. By contrast, under the simulation approaches (whether macro or micro), by establishing an empirical relation between the targets and their correlates, the feasibility of the targets is evaluated according to the feasibility of the required growth path of their correlates.

Hicks and Wodon (2002) have summarized results obtained for many Latin American countries from the application of "SimSIP Goals", a very simple macro-based Excel-based simulation tool available free of charge at www.worldbank.org. To predict future values for social indicators, the SimSIP simulator takes into account projections for future GDP growth, population growth, and urbanization, and elasticities of poverty and social indicators to these variables. The elasticities for each social indicator are based on regressions from world-wide panel data. Time trends are also estimated from country-level data. The hypotheses for urbanization and population growth follow baseline scenarios from the United Nations. The hypothesis for real GDP growth is an average rate of growth per year for 2000–2015, which has been set at 4.5 percent for Mexico. Apart from assessing whether countries will reach targets for malnutrition, education, and health indicators, the authors also provide estimates of whether countries will reach poverty targets using elasticities of poverty to growth (this is a different approach than the one adopted for estimating future poverty levels in Table 5-6).

The authors find that Mexico may reduce its share of the population in extreme poverty by half between 1990 and 2015, but this is not certain. A reduction by half in malnutrition is more likely to be achieved, as is the target of near universal primary school completion. However, the targets for infant and under five mortality are very ambitious, so that it remains unclear as to whether they will be achieved, despite substantial progress in the 1990s. Mexico is not the only country in Latin America that may have difficulties ion reaching the MDGs–for most other Latin America countries as well, many of the MDGs will be difficult to reach. The findings are summarized in note number 8 in the *En Breve* series, at http://www.worldbank.org/en_breve.

because no progress has been achieved since 1990 or is to be expected by 2015, but rather because the targets are very ambitious. The same type of findings are likely to apply to the southern states, where as already mentioned for poverty, reaching the targets may be even more difficult. Reaching universal primary education completion will also be tougher in the south, since the current levels of enrolment and completion are lower there than nationally.

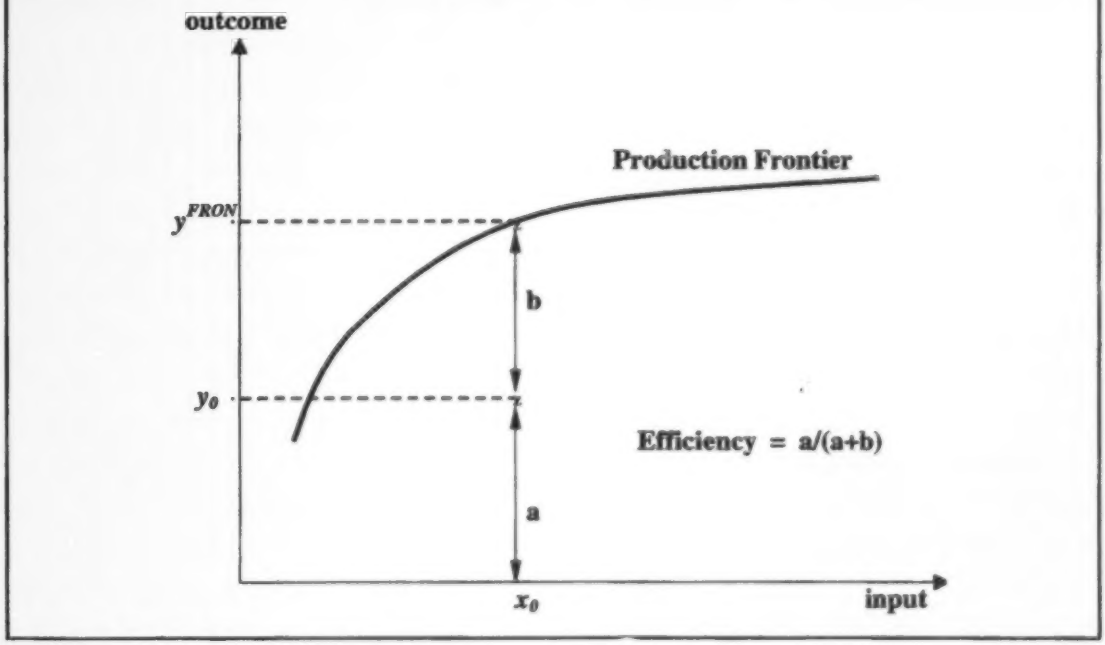
Measuring the South's Efficiency in Improving Health Indicators

The previous sections have suggested that the southern states are still lagging far behind other states in a number of areas. In this section, we tackle the question of how could the southern states improve their education and health indicators. This is done at a fairly general level (see Box 5-3 for a brief description of the methodology). Still, our findings may provide some broad ideas of what could be achieved in the best of worlds. For this, we will first consider health. The level of public spending per capita on health is potentially a key determinant of health outcomes. However, higher levels of social spending alone may not be sufficient to improve health indicators if they are not accompanied by higher levels of efficiency in public spending. In other words, given the relative scarcity of resources in Mexico as a whole and in the southern states especially, increasing spending to improve health indicators may not be the sole or even the most desirable alternative. Better outcomes might also be reached through a more efficient use of existing resources. This section and the next focus on these issues.

BOX 5-3: MEASURING STATE EFFICIENCY IN IMPROVING EDUCATION AND HEALTH INDICATORS

Consider the one-input one-output example in Figure 5-1. The objective or outcome is depicted along the vertical axis while input use to reach this outcome is depicted on the horizontal axis. The curved line (i.e., the production frontier) represents the maximum possible level of the outcome that can be obtained for a given level of input use. The efficiency (E) of public spending can be defined as the ratio of attained or observed outcome to the best practice outcome for a given level of input use. Assume that a country produces "a" units of outcome from x_0 units of inputs, and that under perfect efficiency it could have produced "a+b" units of the outcome. Efficiency E would then be "a/(a+b)". While the outcome could be improved through an expansion of input use, keeping efficiency constant, it can also be improved through an increase in efficiency, keeping input use constant, or a combination of both.

FIGURE 5-1: MEASURING EFFICIENCY OF INPUT USE



Source: Jayasuriya and Wodon (2003).

In order to measure the efficiency of various provinces in improving health and education indicators, Jayasuriya and Wodon (2003) estimate production frontiers using a stochastic frontier approach, so that the efficiency measures are obtained relative to these estimated frontiers. Per capita GDP, per capita expenditures on the respective social sectors (primary education, secondary education, or health), adult literacy, time (as a proxy for technological progress and other exogenous factors), and in some cases other variables are used as inputs to determine the shape of the production frontier. The efficiency measures are then used to compare the actual outcomes for the indicators in the latest period under review to the outcomes that would be observed under perfect efficiency.

In order to measure the efficiency of each Mexican state in improving health indicators, we use the results presented in Jayasuriya and Wodon (2003; see also Jayasuriya and Wodon, 2002, for a similar approach using world data). Infant and child mortality are the two health indicators considered. State-level data for the period 1990–1996 are used for the empirical analysis (the data is from the *Programa Nacional de Accion en Favor de la Infancia*). We use seven inputs in the health production functions: per capita GDP, per capita expenditure on health, the adult literacy rate, the vaccination rate, the rate of access to public hospitals, the rate of access to potable water, and time to capture potential technological progress.

Basic statistics (Mexico's state average, southern state average and values for Chiapas, Guerrero and Oaxaca) for the health outcomes and input measures are provided in Table 5-7. In order for the production frontier formulation to have larger numbers depicting better outcomes, infant non-mortality rate (per 100) and child non-mortality rates (per 100) are used as health outcome measures. These non-mortality rates are defined as one hundred minus the corresponding mortality rates. The mean values of the health outcome measures and inputs used to reach these outcomes indicate that the southern states fare worse than the Mexican state average values. The "infant non-mortality rate" for the average Mexican state is approximately one percent better than the corresponding southern state outcomes (97.35 per 100 in Mexico versus 96.51, 95.47 and 96.60 per 100 in the southern states: Chiapas, Guerrero and Oaxaca). The "child non-mortality rate" indicates an even larger disparity. The Mexico state average is one and half percent better than the corresponding southern state outcomes (96.77 per 100 in Mexico versus 94.95, 94.81 and 95.10 in the southern states).

Not surprisingly, the input measures for the average Mexican state are also better than those observed in the southern states. The state average GDP per capita is approximately twice larger in the country as a whole than in the southern states (11,622 pesos in Mexico versus 5,346, 7,148 and 5,440 pesos in the southern states). The same is observed for per capita health expenditure (327 pesos in Mexico versus 168, 185 and 168 pesos in the southern states). The average Mexican state adult literacy rate is approximately 13 percent higher than in the southern states (88.7 percent in Mexico versus 72.8, 75.2 and 75.4 in the southern states). The vaccination data indicates that the Mexican average is much better than in Chiapas (90.8 in Mexico versus 76.7 in Chiapas), but only slightly better or on par with Guerrero and Oaxaca (90.8 in Mexico versus 90.8 and 89.0 in Guerrero and Oaxaca respectively). The Mexico state average for access to public hospitals and access to potable water are roughly 20 points better than in the southern states (access to public hospitals: 77.4 in Mexico versus 56.2, 55.8 and 59.3 in the southern states; access to potable water: 86.5 in Mexico versus 66.0, 65.0 and 66.0 in the southern states).

TABLE 5-7: HEALTH OUTCOME AND INPUT USE MEASURES FOR INFANT AND CHILD MORTALITY

	State	Southern	Chiapas	Guerrero	Oaxaca
Non-infant mortality, per 100†	97.35	96.19	96.51	95.47	96.60
Non-child mortality, per 100†	96.77	94.95	94.95	94.81	95.10
GDP, per capita (const 1999 pesos)	11,622	5,978	5,346	7,148	5,440
Expenditure, per capita (const 1999 pesos)	326.85	173.98	168.49	185.10	168.35
Adult literacy (% of population)	88.69	74.48	72.79	75.23	75.41
Vaccination (% of population)	90.81	85.49	76.70	90.80	88.96
Access to public hospitals (# of births)	77.42	57.10	56.20	55.80	59.30
Access to potable water (% of population)	86.53	65.67	66.00	65.00	66.00

Sources: Jayasuriya and Wodon (2003), based on INEGI, DGIED, INEA, Consejo Nacional de Vacunacion (Mexico) and Comision Nacional del Agua (México); † non-mortality rates are used in the estimation.

Three separate models (to test for the robustness of the results) have been used to estimate the relationships between the inputs and the best possible health outcomes that can be achieved by the various states. The differences between the three models lie in the inclusion of the per capita GDP and per capita health expenditure variables. Model I has both variables, while models II and III have only one of the two variables included in the specification. The production frontier coefficients in Table 5-8 provide the results of the estimations. They suggest the following:

- Per capita GDP has a positive and statistically significant impact on infant and child mortality. An increase in per capita income of 1,000 pesos reduces infant and child mortality by 0.3 and 0.4 per 1,000 births respectively. Given that the average state infant and child mortality rates are 26.5 and 32.3 per 1,000, these impacts are small (1.1 percent of infant mortality and 1.2 percent of child mortality).
- A one percent improvement in the adult literacy rate has a positive and statistically significant impact on infant mortality (reduction by 0.7 to 0.8 per 1,000 births) and child mortality (reduction by 1.0 to 1.2 per 1,000 births). Given the average state infant and child mortality rates mentioned above, these impacts are larger than those observed for GDP (reduction by 2.8 percent of infant mortality and 3.4 percent of child mortality).
- The vaccination rate also has a positive and statistically significant impact on infant and child mortality. A one percent increase in the vaccination rate reduces the infant mortality rate by 0.1 per 1,000 births, while child mortality rate declines by 0.2 per 1,000 births. This represents a 0.4 percent reduction in infant mortality and a 0.6 percent reduction in child mortality. (Note that it was to be expected that the impact of vaccination would be larger on child than infant mortality.)
- Time also has a positive and statistically significant impact on health outcomes, with each additional year reducing infant mortality by 0.5 to 0.9 per 1,000 births, and child mortality by 0.5 to 1.1 per 1,000 births. This represents approximately 2.6 percent of the existing infant mortality rate and 2.5 percent of the child mortality rate. The impact of time is probably due to progress in medicines and care.
- By contrast, the impact of per capita health expenditure is not statistically significant albeit being positive in all three specifications of the model. Similarly, the other two variables,

TABLE 5-8: PRODUCTION FRONTIER COEFFICIENTS FOR INFANT AND CHILD MORTALITY, 1990–1996

	Infant mortality†			Child mortality†		
	Model I	Model II	Model III	Model I	Model II	Model III
Constant	90.71	90.06	90.49	85.59	84.86	85.48
GDP pc (1993 pesos)	0.00003	–	0.00003	0.00004	–	0.00004
Expenditure, per capita	NS	NS	–	NS	NS	–
Adult literacy (% of pop.)	0.06894	0.07893	0.07090	0.10379	0.11964	0.10480
Vaccinations (%complete)	0.00844	0.01038	0.00759	0.01920	0.02181	0.01819
Access public hosp. (% pop.)	NS	NS	NS	NS	NS	NS
Access water (% pop.)	NS	NS	NS	NS	NS	NS
Year	0.07367	0.05237	0.09479	0.09057	0.05423	0.11330
Number of Observations	224	224	224	224	224	224

Source: Jayasuriya and Wodon (2003). †non-mortality rates are used in the estimation. NS means not statistically significant. Other coefficients are statistically significant at the 5% level or better.

namely access to public hospitals and access to potable water, do not appear to have positive and statistically significant impacts on infant and child mortality in this estimation (in other models in the literature, positive relationships have been found).

Beyond the estimates of the impact of various potential inputs on outcomes, the estimation method provides estimates of the efficiency of various states in reaching the best possible outcomes. We have three different estimates of efficiency, one each for the different specifications of the production frontier. Figures with the state level efficiency measures for Model I are provided in appendix for easier comparisons and rankings. As shown in Table 5-9, the efficiency in reaching the best possible health outcomes for infant and child mortality in Chiapas and Oaxaca are on par (or sometimes better) with the Mexican state averages. The Guerrero efficiency measures, however, are below the Mexican average for all models, which suggests that some focus be placed on the issue in that state.

Importantly, the fact that the efficiency measures in Table 5-9 appear to be very high does not mean that no progress could be achieved with better efficiency. Indeed, the measures must be interpreted with care given the way the indicators have been defined. For example, in the preferred specification of Model I, an infant mortality efficiency measure of 98.62 for Guerrero (99.80 for Oaxaca; 99.91 for Chiapas) means that under perfect efficiency and at the current level of input use, infant mortality could be improved by 13.3 per 1,000 births (for Oaxaca: 1.9 per 1,000 births; for Chiapas: 0.9 per 1,000 births). Similarly for the child mortality rates, an efficiency measure of 99.13 for Guerrero (99.49 for Oaxaca; 99.80 for Chiapas) means that under perfect efficiency and at the current level of input use, child mortality could be improved by 8.3 per 1,000 births (for Oaxaca: 4.9 per 1,000 births; for Chiapas: 2.0 per 1,000 births). The infant mortality and child mortality figures presented below provide actual and optimal outcome measures for Chiapas, Guerrero, Oaxaca, and the averages for Mexico and the southern states.

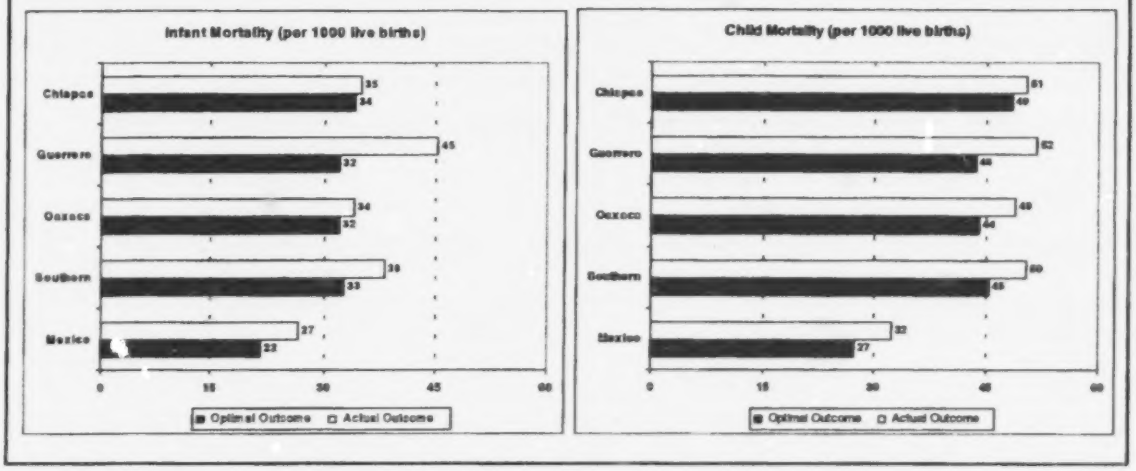
The conclusion of this analysis regarding the scope for efficiency gains in reaching better outcomes in infant and child mortality is that in Guerrero, apart from low levels of "inputs," inefficiencies in using existing inputs explain part of the lags. In Chiapas and Oaxaca, the situation is better. Yet this does not mean that there is no scope for efficiency gains in these two states, since the benchmark for the comparison of the efficiency of the southern states is the other states, and there may be scope for efficiency gains throughout Mexico which are not captured in our analysis. As will be mentioned briefly in the last section of this chapter, since broad increases in public spending are not likely to have a large impact on the outcomes considered here, targeted programs such as PROGRESA may be a large part of the answer to improve inputs, efficiency, and outcomes at once (the evaluation of PROGRESA prepared by the International Food Policy Research Institute does suggest important gains in health indicators).

TABLE 5-9: STATE-LEVEL EFFICIENCY MEASURES FOR HEALTH OUTCOMES, 1990–1996

	Mexico average	State level averages			
		Southern	Chiapas	Guerrero	Oaxaca
Infant mortality, Model I†	99.48	99.44	99.91	98.62	99.80
Infant mortality, Model II†	99.46	99.42	99.91	98.60	99.74
Infant mortality, Model III†	99.48	99.45	99.91	98.63	99.80
Child mortality, Model I†	99.49	99.47	99.80	99.13	99.49
Child mortality, Model II†	99.43	99.41	99.79	99.07	99.37
Child mortality, Model III†	99.45	99.44	99.76	99.11	99.45

Source: Jayasuriya and Wodon (2003). †non-mortality are rates used in the estimation.

FIGURE 5-2: ACTUAL AND OPTIMAL OUTCOMES FOR INFANT AND CHILD MORTALITY



Source: Authors.

Measuring the South's Efficiency in Improving Education Indicators

A similar analysis has been conducted for education outcomes. We consider three outcomes here: net primary enrolment, net secondary enrolment, and test scores (for grades 1 to 6). We use data for two years: 1994 and 2000. The net enrolment rates are used as proxies for education flow or "quantity" variables, while test scores are used as education "quality" measures. Table 5-10 presents mean values for the education outcomes, and the related inputs. The net primary and secondary enrolment average in the southern states fare worse than the Mexican average, but the education quality measure is on par (Table 5-10). The net primary enrolment rate for the Mexico state average is 8 percent better than the southern state average outcome (93.2 in Mexico versus 77.9, 86.9 and 88.2 in the three southern states). The net secondary enrolment rate differences are larger, with the Mexico state average being 13 percent higher than the southern state average (60.4 in Mexico versus 39.4, 50.5 and 51.2 in the southern states). The test scores in the southern states, however, are on par with the Mexico state average.

The input levels used to reach outcomes in the south are below the Mexican state average, as is well known. The comparison of the state average GDP per capita and the adult literacy rate were

TABLE 5-10: STATE-LEVEL ENROLMENT RATES, TEST SCORES AND INPUT MEASURES, 1994 AND 2000

	State	Southern	Chiapas	Guerrero	Oaxaca
Net primary enrolment (% of students)	93.21	84.32	77.85	86.95	88.15
Net secondary enrolment (% of students)	60.43	46.98	39.35	50.45	51.15
Test scores (grades 1 to 6)	44.81	44.65	45.33	43.92	44.71
GDP, per capita (const 1993 pesos)	13,579	6,617	6,086	7,649	6,116
Expenditure primary, per capita	564.75	485.77	351.24	554.23	551.84
Expenditure secondary, per capita	235.74	168.19	127.84	192.35	184.37
Adult literacy (% of population)	89.90	76.87	75.60	77.35	77.65

Sources: Jayasuriya and Wodon (2003), based on CIFRA, INEGI, and INEA.

already done in the case of the health analysis (we use these two variables as inputs for both sectors). Per capita net primary education expenditure are higher in the average Mexican state than in the south (565 constant pesos in Mexico versus 351, 554 and 552 constant pesos in the southern states), and the same is true for net secondary education expenditure per capita (236 constant pesos in Mexico versus 128, 192 and 184 constant pesos in the southern states).

Similar to the health outcome analysis, three separate models are used to estimate the relationships between the inputs and the best possible education outcomes that can be achieved by the states, with the differences between the models consisting of the inclusion of per capita GDP, per capita education expenditure, or both. The estimation results suggest the following:

- Per capita GDP and per capita expenditure on primary or secondary education do not have a statistically significant impact on net primary enrolment, net secondary enrolment and test scores.
- Adult literacy has a positive and statistically significant impact on all three outcomes: primary enrolment, secondary enrolment and test scores. A one percent increase in adult literacy leads to a 0.65 percent improvement in net primary enrolment, a 1.0 percent improvement in net secondary enrolment, and a 0.05 improvement in test scores.
- The time variable also has a statistically significant and positive impact on the primary enrolment, secondary enrolment and the test scores. One year leads to a 0.6 percent increase in both the net primary and net secondary enrolment rates, and a 0.2 increase in the test scores (the estimates in table 5-11 for time capture the impact of several years).
- For the test scores, the grade variable is positive and statistically significant, which indicates that as a student advances a grade the test score increases (by 0.87 points.)

As was the case for health, beyond the estimates of the impact of various potential inputs on outcomes, the estimation method provides estimates of the efficiency of various states in reaching the best possible outcomes. We again have three different estimates of efficiency, one each for the

TABLE 5-11: PRODUCTION FRONTIER COEFFICIENTS FOR ENROLMENT RATES AND TEST SCORES

	Net primary enrolment			Net secondary enrolment		
	Model I	**Model II**	**Model III**	**Model I**	**Model II**	**Model III**
Constant	33.64	35.35	33.64	NS	−38.59	NS
GDP, per capita	NS	–	NS	NS	–	NS
Expenditure, per capita	NS	NS	–	NS	NS	–
Adult literacy (% of pop.)	0.6546	0.6145	0.6452	1.0394	1.2073	1.0287
Year	4.0167	4.1772	4.4125	4.3167	4.3619	4.1144
Number of Observations	64	64	64	64	64	64
				Test scores (grades 1 to 6)		
				Model I	**Model II**	**Model III**
Constant				39.07	38.29	38.42
GDP, per capita (constant 1993 pesos)				NS	–	NS
Expenditure, per capita				NS	NS	–
Adult literacy (% of population)				0.0405	0.0503	0.0456
Grade				0.8739	0.8743	0.8713
Year				0.6105	0.6089	0.6192
Number of Observations				318	318	318

Source: Jayasuriya and Wodon (2003). NS means not statistically significant. Other coefficients significant at the 5% level or better.

TABLE 5-12: EFFICIENCY MEASURES FOR ENROLMENT RATES AND TEST SCORES

	State	Southern	Chiapas	Guerrero	Oaxaca
Net primary enrolment, Model I	95.39	94.71	92.65	95.59	95.90
Net primary enrolment, Model II	96.28	95.74	94.28	96.35	96.59
Net primary enrolment, Model III	95.66	95.00	93.10	95.81	96.09
Net secondary enrolment, Model I	80.84	77.78	67.69	82.37	83.28
Net secondary enrolment, Model II	79.26	77.28	67.10	82.06	82.67
Net secondary enrolment, Model III	80.89	77.82	67.76	82.38	83.32
Test scores (grades 1 to 6), Model I	95.85	96.38	97.34	95.29	96.50
Test scores (grades 1 to 6), Model II	95.91	96.49	97.45	95.43	96.60
Test scores (grades 1 to 6), Model III	95.81	96.46	97.53	95.34	96.52

Source: Jayasuriya and Wodon (2003).

different specifications of the production frontier. As shown in Table 5-12, for efficiency in net primary enrolment, Chiapas is well below the Mexican state average, but Guerrero and Oaxaca are on par or slightly above the state average. A similar results holds true for the secondary enrolment efficiency measure. For test scores efficiency, all three states are roughly on par (or sometimes slightly better) than the Mexico state average. Figures providing the efficiency measures for all the states are provided in appendix, as was done for health.

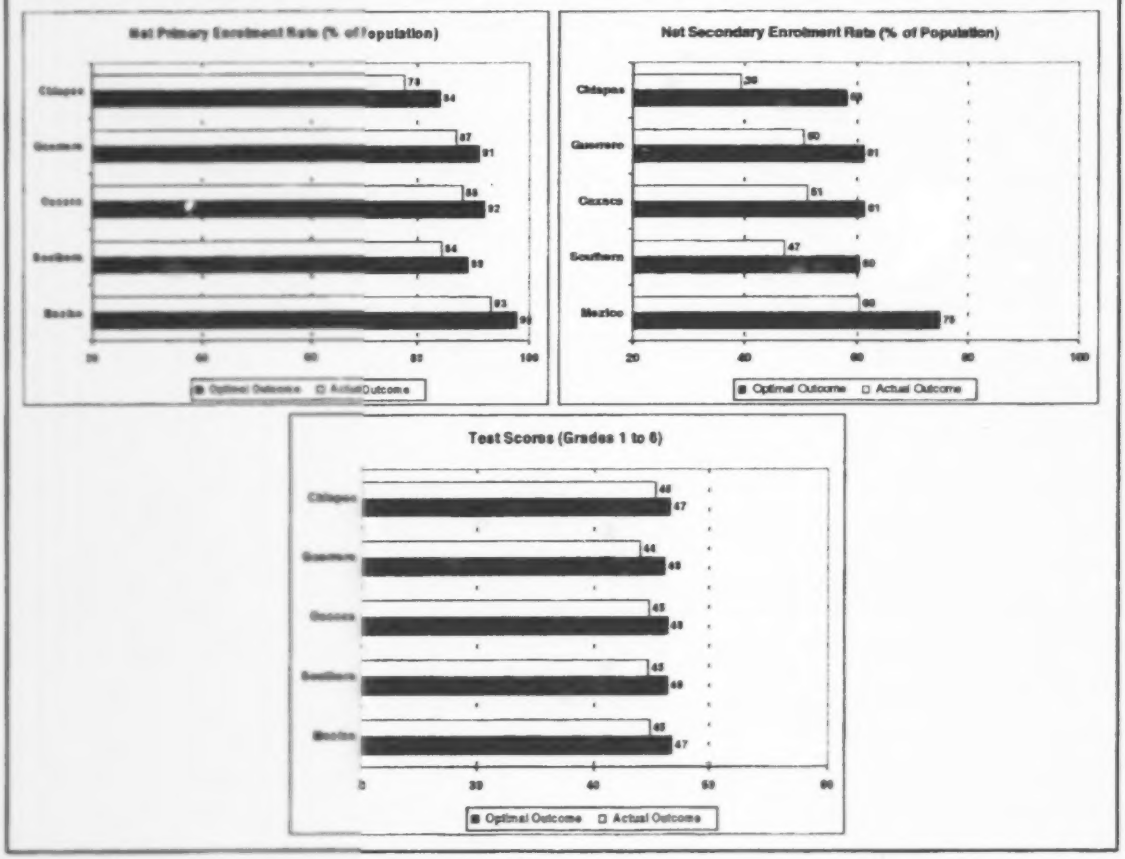
The net primary enrolment, net secondary enrolment and test scores figures presented below provide the actual and optimal outcomes for Chiapas, Guerrero, Oaxaca, and the averages for Mexico and for the southern states. Broadly speaking, with the exception of net enrolment rates in Chiapas, low levels of "inputs" rather than high inefficiencies in using existing inputs explain most of the lags observed in the south. But, as already mentioned for health indicators, this does not mean that there is no scope for efficiency gains (the benchmark for the comparison of the efficiency of the southern states is the other states, and there may be scope for efficiency gains throughout Mexico which are not captured in our analysis). Also, since broad increases in public spending are not likely to have a large impact on outcomes, targeted programs may be the option, and here again programs such as PROGRESA should be part of the answer (the evaluation of PROGRESA also suggests important gains in education, especially at the secondary level).

Moving Forward: Smart Targeted Programs and Local Capacity Building

Several conclusions emerge from the analysis presented so far. First, the southern states may not be able to reduce extreme poverty by half by 2015, and they also lag behind in a wide range of other indicators related to education, health, and access to basic infrastructure. Second, broad-based per capita spending on education or health may have little impact on outcomes. Third, in the state of Guerrero for health and in the state of Chiapas for school enrolment rates, apart low levels of inputs, inefficiencies in using existing inputs explain part of the lags observed versus other Mexican states. Given these findings, a development strategy for the south should emphasize the role that must be played by smart targeted programs, but it should also emphasize capacity building at the municipal and state levels to improve efficiency.

An example of a smart targeted program is PROGRESA. PROGRESA is well targeted through a three stage targeting mechanism consisting of the selection of communities in which the program is implemented, the selection of beneficiary households in these communities, and the (little used) possibility for local authorities to suggest changes in the list of beneficiaries to the administrators of the program. Additionally, three features of the program are worth emphasizing here in relationship to the targets in the MDGs:

FIGURE 5-3: ACTUAL AND OPTIMAL OUTCOMES FOR SCHOOL ENROLMENT AND TEST SCORES



Source: Authors.

- ***Integrated program benefits.*** Interventions to improve the education, health, and nutrition of children in poverty are known to have potential for long-term positive impacts on well-being. PROGRESA's originality is that it is trying to build synergies between education, health, and nutrition. Synergies may arise because of economies of scope in providing the interventions or because of cumulative effects of various types of interventions on outcomes. The cumulative effects may be concurrent, as when current dietary intakes increase the effectiveness of current time in school learning. They may also arise with a lag, as when infant malnutrition affects adult productivity (Behrman, 2000).
- ***Conditionality and long-term gains in human capital:*** PROGRESA benefits are conditional in order to promote behavioral changes among program beneficiaries. The children must attend school for 85 percent of school days, to qualify for school transfers, which has probably helped to increase impacts on enrolment. According to Shultz (2000), the program has succeeded in increasing primary school enrolment by 0.96 to 1.45 percentage point for girls, and by 0.74 to1.07 point for boys. In secondary school, where pre-program enrolment rates were lover, the proportional increase have been 11 to 14 percent for girls and 5 to 8 percent for boys. There are also conditionalities in health and nutrition. To receive food transfers, households must attend mandatory health care meetings and visits in public clinics which include growth monitoring, preventive yearly physical exams and

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monthly sessions on health and well-being issues. Thanks to PROGRESA, pre-natal care visits increased by 8 percent in the first trimester of pregnancy (Gertler, 2000), which was documented to have a significant effect on the health of babies and pregnant mothers. These conditionalities, or rather the positive changes promoted by the program are likely to generate large future gains in well-being.[18]

- *Gender focus:* A third interesting feature is related to gender, intra-household allocations and power structures. PROGRESA transfers are directed towards households as the program starts from the idea that poverty is the result of inadequate family and individuals capabilities, yielding low levels of social functioning. But in addition, the cash transfers accrue to the women in the households, as the intra-household literature has shown that they will focus expenditures more towards children's health and consumption. Furthermore, recognizing the gender bias in schooling decisions for secondary school enrolment, transfers are higher for girls than for boys. These and other provisions give the program a strong gender focus in its delivery mechanism.

PROGRESA is not the only program targeted to the poor in Mexico, but is has become the largest, especially in the southern states, and it is the only program for which detailed evaluation results are available (the reader is referred to the in-depth evaluation of the program by IFPRI, at www.ifpri.org). While this warrants the above summary of key impacts, our emphasis on PROGRESA as an example of a successful program in the south does not mean that other programs could not and should not be implemented (for example to benefit indigenous peoples).

Before concluding, going back to the issue of efficiency, we would like to emphasize one point related to capacity building. As noted by Christiaensen et al. (2002), when assessing whether development targets are realistic, one important aspect concerns the authorities' capacity to implement programs, not only at the federal level, but also at the state and local levels. According to Bevan (2001), financial sustainability refers to whether a planned expenditure path can be funded without unacceptable financing consequences for either the public or private sectors. This relates to acceptable levels of budgetary deficits at various levels of government.

By contrast, absorptive sustainability refers to whether a planned expenditure path can be implemented, even if it can be financed. This relates to the capacity to implement programs in a satisfactory way. For example, large sums of money are now being transferred to states and municipalities through a social fund using a pro-poor formula based on the so-called *Masa Carencial Municipal*. The formula has dramatically increased the available social infrastructure funding for the poorest states, and within these states, the poorest municipalities. However, mechanisms to properly monitor the allocation of funds within municipalities have yet to be found. Many local

18. Consider for example the education component of PROGRESA (Wodon et al., 2003). The long term "income multiplier" effect of the investments in the education of children can be computed as follows. Consider a boy receiving stipends and other direct benefits for 7 years (grade 3 of primary school to grade 9 of secondary school), at a cost of 13,170 pesos in 1999. If administrative costs are 9 percent of outlays, total cost is 14,473 pesos (13,170/0.91). The boy may expect an increase in schooling of 0.64 year attributable to PROGRESA, with a return of 8 percent per additional year of schooling. Assuming the boy migrates to urban areas upon adulthood (and thereby earns an urban wage), and using a discount rate of 5 percent per year, the net present value of future earning gains can be estimated at 102,000 pesos (taking into account the probability of working and the age profile of earnings.) This yields a multiplier of 7 (102,000/14,473). But some boys will remain in rural areas where wages are lower. The estimation also does not account for losses in child labor wages and other costs (e.g., private costs of schooling). For girls, the increase in years of schooling is larger, but labor force participation and thus future wages are lower, while program costs are larger (stipends are higher for girls in secondary school). All in all, a multiplier of 5 for boys and girls taken jointly may well be realistic (this value is presented only for illustration; more details estimates could be provided). In other words, an investment in program costs of one peso today is probably worth 5 pesos in future discounted benefits for the program's beneficiaries.

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governments are probably lacking the expertise and personnel to manage the funds, and sufficient resources have not yet been made available to help them increase their operating budgets, hire new staff or train existing staff, and modernize their administration.

In the broader context of the impact that gains in efficiency could have on education and health indicators, capacity building for municipalities and states in administering decentralized funds will be key. Indeed, at the cross-country level, the issues of governance and the quality of the bureaucracy have been shown to be key determinants of the efficiency in improving education and health indicators (see Box 5-4). The same is likely to be true within Mexico.

BOX 5-4: WHAT IS DRIVING EFFICIENCY? RESULTS FROM A CROSS-COUNTRY ANALYSIS

Governments aiming to improve the education and health status of their populations can increase the level of public spending allocated to these sectors, or improve the efficiency of public spending. Since increasing spending is often difficult due to a limited tax base, improving the efficiency of public spending becomes crucial. In order to improve this efficiency, governments have at least two options. The first consists of changing the allocation mix of public expenditures. For example, Murray et al. (1994) argue that by reallocating resources to cost-effective interventions, Sub-Saharan African countries could improve health outcomes dramatically. The second option is more ambitious: it consists of implementing wide-ranging institutional reforms in order to improve variables such as the overall level of bureaucratic quality and corruption in a country, with the hope that this will improve the efficiency of public spending for the social sectors, among other things.

In a recent background paper for the World Bank's *World Development Report 2003,* Jayasuriya and Wodon (2002, chapter 2 of the present study) use stochastic production frontier estimation methods to compare the impact of the level of public spending on education and health outcomes on the one hand, and the efficiency in spending on the other hand, using life expectancy and net enrolment in primary school as outcome indicators. After estimating efficiency measures at the country level, the authors analyze in a second step how the quality of the bureaucracy, corruption, and urbanization affect efficiency. They find that urbanization, the quality of the bureaucracy, and to some extent the level of corruption are strong determinants of the efficiency of countries in improving education and health outcomes.

The institutional variables, i.e. the corruption and bureaucratic quality indices, were obtained from the International Country Risk Guide (ICRG) published by Political Risk Services (PRS). The ICRG indices are subjective assessments based on an analysis by a worldwide network of experts. To ensure coherence and cross country comparability, these indices are subject to a peer review process. The corruption index measures actual or potential corruption within the political system, which distorts the economic and financial environment, reduces government and business efficiency by enabling individuals to assume positions of power through patronage rather than ability, and introduces inherent instability in the political system. The bureaucratic quality index measures the strength and expertise of the bureaucrats and their ability to manage political alterations without drastic interruptions in government services or policy changes. For the corruption index, higher values indicate a decreased prevalence of corruption. For the bureaucratic quality index, higher values indicate the existence of greater bureaucratic quality.

Together, the level of corruption of a country, the quality of its bureaucracy, and its level of urbanization explain together half of the variation in efficiency measures between countries in improving health and education outcomes. Although such analysis cannot be replicated within Mexico (because good measures of corruption and the quality of the bureaucracy are not available at the state level), broadly similar results might well be found to apply in terms uncovering some of the key determinants of state-level efficiency.

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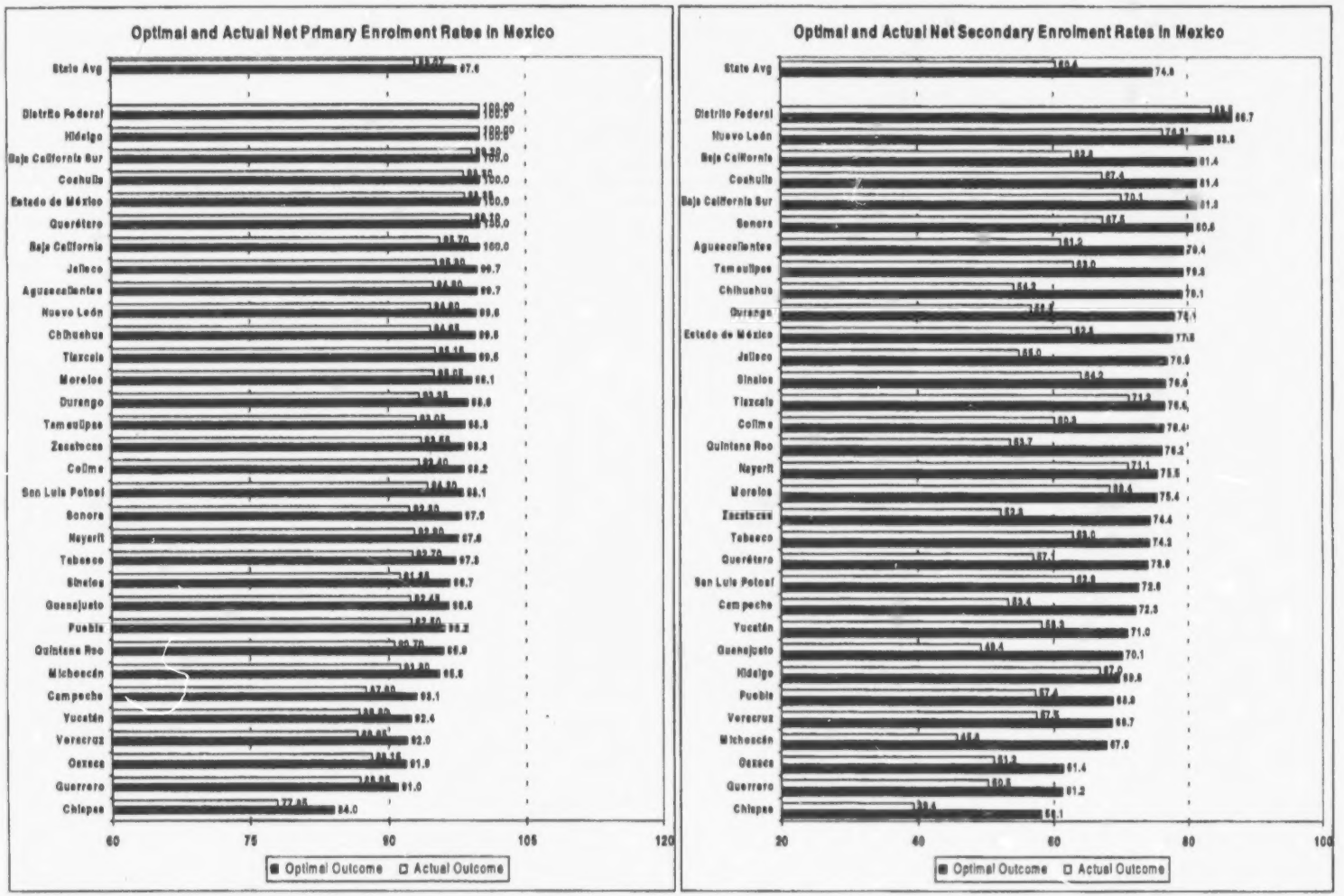
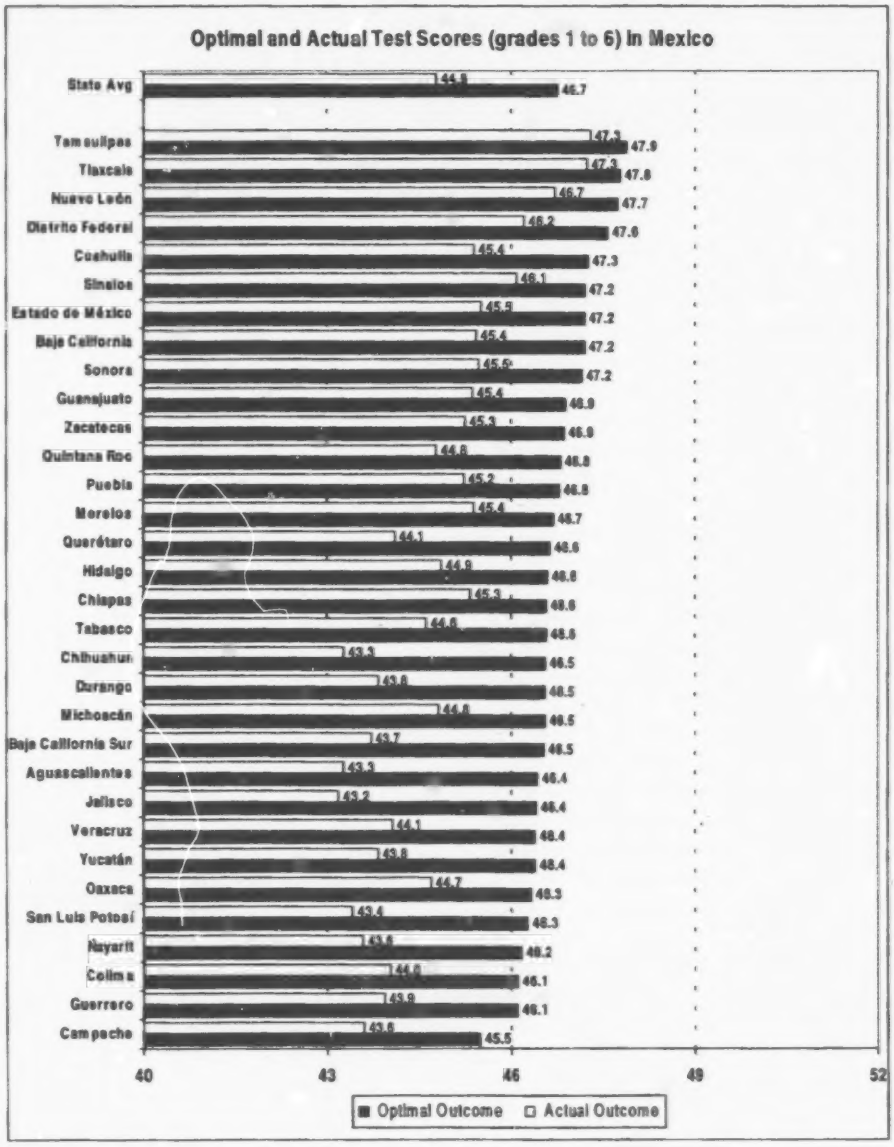
APPENDIX FIGURE A5-1: OPTIMAL AND ACTUAL ENROLMENT OUTCOME MEASURES BY STATE IN MEXICO, AVERAGE 1994 AND 2000



Source: Authors.

APPENDIX FIGURE A5-2: OPTIMAL AND ACTUAL TEST SCORES OUTCOME MEASURES BY STATE IN MEXICO, AVERAGE 1998–2000



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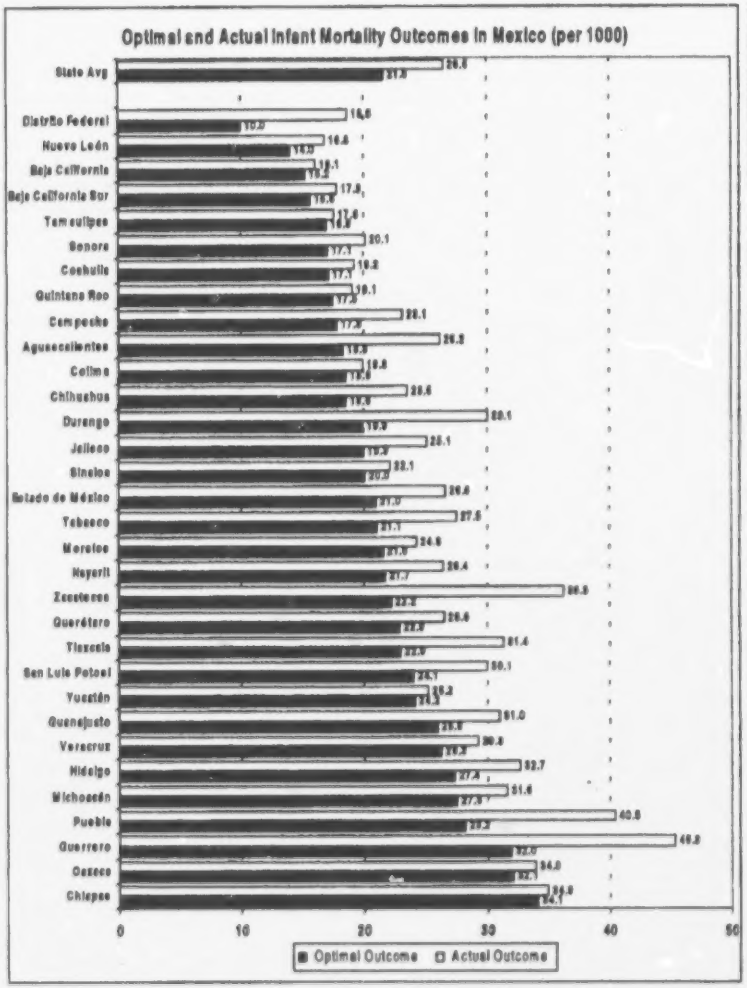
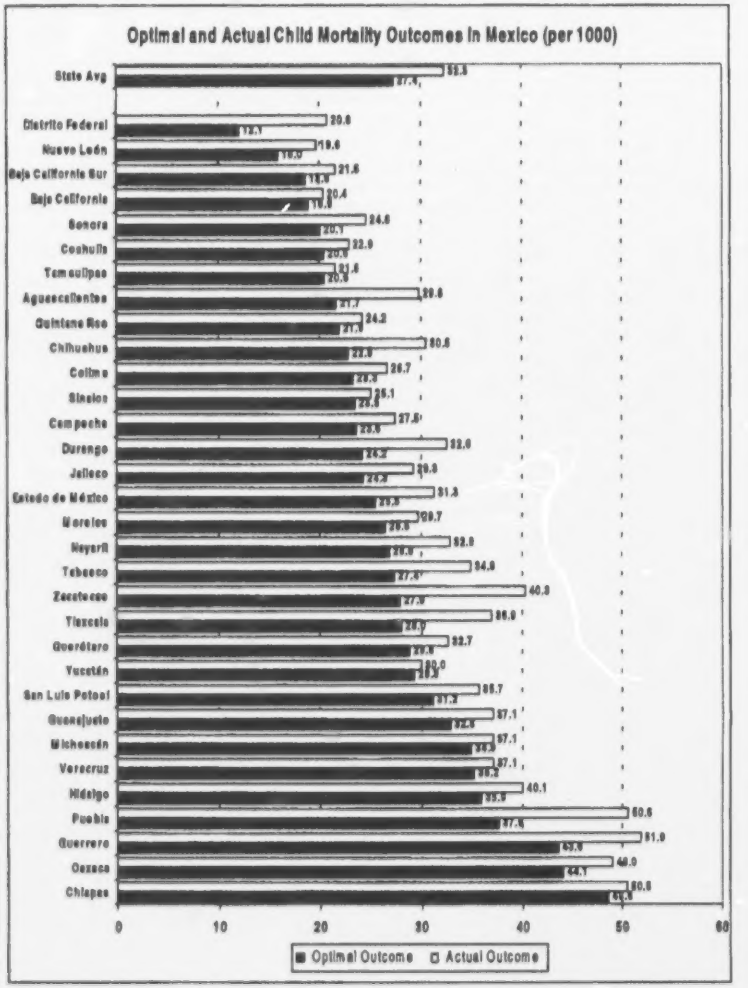
APPENDIX FIGURE A5-3: OPTIMAL AND ACTUAL HEALTH OUTCOME MEASURES BY STATE IN MEXICO, AVERAGE 1990–1996





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Two chapters use world panel data to analyze country level efficiency in improving education, health, and GDP (and thereby poverty) indicators. Two other chapters use province and state level data to analyze within-country efficiency in Argentina and Mexico for improving education and health outcomes. Together, the four chapters suggest that apart from increasing inputs, it is necessary to improve efficiency in order to reach the MDGs. While this conclusion is hardly surprising, the analysis helps to quantify how much progress could be achieved through better efficiency, and to some extent, how efficiency itself could be improved.

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